Occidental Medical Times

VOLUME XVI. SAN FRANCISCO, DECEMBER, 1902. NUMBER 12.

ON FLATFOOT; ITS MECHANICS AND TREATMENT.

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Read before the San Francisco County Medical Society, Sept. 10, 1902.

Mr. President and Gentlemen: The term "flatfoot" was employed in the title of this paper that exception might be taken to it. It is objectionable because it is misleading; for it applies to only one of several types of a general condition. Moreover, the changes which affect the function of the member most seriously are not seen in the foot itself, but in the relation of the foot to the leg. All the subjective symptoms of this affection may be present with no depression of the arches of the foot, and even with an exceptionally high arch. At the same time the expressions, pes valgus, pronated foot, abducted foot, are not satisfactory, because none of them adequately defines the general condition present, and because patients are seen, especially in the beginning stages of this affection, who, instead of toeing out, turn their toes in. It is for the toeing in that they apply for treatment. Therefore, because of the general condition which underlies these several manifestations,—the disproportion between the work to be done and the power to do it, —it seems best to apply to this condition the term "weakfoot."

Weakfoot seems to be a condition peculiar to civilized peoples. Among the barefooted and sandal-wearing races it is apparently unknown. The statues which have come down to us from the ancients present various sandal deformities, including compression and crumpling of the fifth toe, but nowhere does hallux valgus, the deviation outward of the great toe, appear. At the same time it is known that the Egyptians wore pointed shoes; and, though their statues present toes invariably straight, it is improbable that they should have escaped the deformities which result from improper shoeing.

According to clinical statistics, almost one-half of all cases of weakfoot present themselves for treatment between the ages of ten and twenty years, and four-fifths of the cases before they are thirty. Statistics represent for the most part cases of the severer types taken from the poorer classes. In private practice it is probable that four-fifths of the patients present themselves for treatment before they have attained their twentieth year. The statistics are none the less interesting. They show that half the time the condition manifests itself during the transitional decade, when the child is growing rapidly into the adult, and that three of the remaining five-tenths of the cases occur during the third decade, when those laborious occupations which compel long hours of standing in the same position are followed. The shop girl, the baker, the car conductor, and the waiter follow occupations of this sort. The Italians call the condition piede dei garzoni d'osteria, or waiter's foot. It is three times as often bilateral as it is unilateral. And when unilateral it is about as frequent in one foot as in the other. As it occurs among the poor, weakfoot is rather less than twice as frequent among males than among females. In 1,000 cases investigated by Whitman, 58 instances gave a history of a traumatic cause, while in 69 it was apparently due to rheumatism or to rheumatoid arthritis.

The anatomy of weakfoot varies with the mildness or severity of the case. In the earlier stages no changes are to be observed beyond a slight exaggeration of the physiological attitude of rest and its persistence during functional use of the limb. It is the attitude of ligamentous support. There is some bulging of the inner side of the foot and more or less flattening of the anterior part of the transverse arch. A line drawn through the middle of the patella and continued down the front of the leg, instead of being prolonged to pass through the interval between the second and third toes, passes well to the innerside of this space.

The children who toe in may not show these symptoms. They are usually overgrown, ill-nourished children, with long slender feet, and loose joints generally. Theirs may be considered the incipient type of weakfoot. The toeing in is an instinctive assumption of the attitude of muscular support, in order to take the strain from the insufficient ligaments. The physical examination shows an abnormal amount of passive mobility, especially in abduction and pronation.

The type of weakfoot of the opposite extreme—the true flatfoot—presents marked anatomical changes. Inspection of its skeleton inspires the idea that its back is broken at the mid-tarsal joint. Of the two bones behind this joint, the os calcis and the astragalus, the former has tilted over to its inner side sufficiently to allow the astragalus to slip, partially or completely, off its back. The anterior extremity of the os calcis is displaced outward and downward, destroying the external arch. The astragalus, besides losing its seat on the os calcis, rotates inward and tilts forward, sinking its head, thus obliterating the internal arch. In its rotation inward it carries the bones of the leg with it, and may eventually rest directly upon the floor. The two bones directly anterior to the mid-tarsal joint, the scaphoid and cuboid, are displaced sharply upward, and together with the rest of the tarsal bones are abducted. In addition to the abduction there is an important rotation inward of the first cuneiform bone about its longitudinal axis. The metatarsals present an ineffectual compensatory adduction contracture, and the great toe shows the classical deformity of hallux valgus. There is marked thickening of the ligaments which normally check the downward and inward rotation of the head of the astragalus, the calcaneo-scaphoid, the deltoid, and the interosseous or subastragaloid ligaments, while the soft parts at the under and inner aspects of the foot are overstretched, and those on the dorsum and outer side are contracted. Atrophy, more or less marked, of the plantar flexors, of the adductor muscles of the foot, and of the calf, is regularly present.

Symptoms.—The first symptom noticed by the patient is a sensation of weariness appearing at the inner side of the foot and ankle during exercise or long standing. This may become an actual pain. Pains beginning as a dull ache may appear in the calf, at the inner side of the knee, the outer aspect of the thigh, in the gluteal and lumbar regions. These pains, which are at first transitory, may increase until they become disabling, and are frequently associated with local tenderness and muscular spasm. Pain and sensitiveness may appear below the external malleolus, at the outer side of the cuboid, and at the center of the heel. Cramps occur in the feet and legs, especially at night. Vascular disturbances cause coldness, congestion, and excessive sweating. The range of motion, especially of supination and of adduction, is progressively diminished, till the foot finally becomes fixed in abduction and pronation. When they stand, these patients throw their weight on their heels. The gait is characteristic; they walk with a shuffling gait, and with abducted feet. There is little or no motion of the joints of the foot; it is removed from the ground in progression by flexing the knee.

The causes of the pains and aches characteristic of weakfoot are to be found in the derangement of the mechanisms by means of which the limb performs its function. It would be impossible to appreciate these changes without first recalling how the erect attitude is maintained. When the erect posture is assured, the center of gravity of the body falls in a line behind the axis of motion at the hip-joints; and the body would topple over backward were it not checked by the powerful ilio-femoral ligaments, which hold it erect upon the femora, and, at the same time, keep the heads of the bones pressed into their sockets. The outer band of the ligament is directed obliquely outward and downward, to insert into the upper and outer part of the inter-trochanteric line, and, when put on the stretch, causes a slight but important inward rotation to occur at the hip-joint.

The line passing through the center of gravity also falls behind the axes of motion at the knees, which would fall forward in flexion were they simple ginglymus joints. This is not the case, however, for when, by a compound movement of gliding and rolling, the leg is extended on the thigh so that the excursion of the external condyle is completed, the internal condyle continues to glide backward, till its oblique anterior part is brought into contact with the tibia. Thus, as a final act, the femur may be said to rotate inward on the tibia (or vice versa), about an oblique axis in the outer part of the external condyle, in this way locking the joint in extreme extension. This "rotary twist" must be overcome before flexion at the knee is possible. The fixation in extension is rendered still more stable by the fact that the outer and posterior part of the head of the tibia is attached to the anterior part of the iliac crest by the ilio-tibial band of the fascia lata, augmented by the tensor fascia; for when the crest is elevated by the tilting backward of the pelvis on the femora, these structures are put on the stretch, and, assisted by the biceps, exert a pull upward, backward, and slightly outward, which not only causes the joint surfaces to be pressed together, but checks any tendency to inward rotation of the tibia. To unlock the knee-joint, these structures have to be relaxed, by tilting the pelvis forward or by flexing the thigh on the pelvis.

The stability of the ankle-joint when the foot is at right angles to the leg is due to the fact that (1) the articulation does not lie in the frontal plane of the body, but is directed obliquely outward, so that the axes of the two ankle-joints meet to form an angle of 169 degrees, opening backward; and (2) the axis is not horizontal, but is tilted outward and downward, so that the axes of the joints meet to include an angle of 154 degrees, opening downward.

When the weight is thrown on the normal foot, the external malleolus drops still further downward and backward, indicating an increase in the obliquity of the joint in both directions. Therefore, so long as the knees are locked in extension, flexion at the ankle-joints could occur only through a divergence of the upper ends of the femora from each other; but this is impossible. By these means the individual with normal limbs is enabled to stand erect without muscular exertion.

In considering the influence of pronation of the foot upon these mechanisms, the foot, because it rests upon the floor, must be regarded as the fixed point, and the bulging of the inner side of the foot, as well as the displacement inward of the line drawn down the front of the leg, must be considered as the result of a rotation inward of the leg and astragalus on the rest of the foot. It has been said that the head of the astragalus sinks as that bone rotates inward, and depresses the inner arch. The result of the rotation is to bring the axis of each ankle-joint more nearly into the frontal plane of the body, while the descent of the inner arch causes it to become more nearly horizontal. Thus the mechanism for maintaining the leg at right angles to the foot without muscular exertion is destroyed, and it can only be done by tipping the leg forward and fixing it by means of the calf muscles. The result of this effort is the dull ache in the calf which was recognized as an early and constant symptom of weakfoot. Sensitive points appear at the outer border of the foot where the peroneous longus emerges from beneath the cuboid, and also over the origin of the muscle in the leg. This is because the inward rotation of the leg causes the origin and insertion of the muscle to approach each other. Therefore the muscle shortens, and is constantly injured, and thrown into a state of spasm when the patient walks on the foot. The occasional spasm of the extensor communis digitorum is from a similar cause.

The rotation inward of the leg on the foot is not less disastrous to the mechanism for locking the knee-joint. It was seen that the joint is locked by a "rotary twist" inward of the femur on the tibia, about an axis passing obliquely downward and inward through the external condyle. The twist inward which the bones of the leg take with the astragalus unlocks the mechanism by carrying the inner part of the head of the tibia backward. The consequence is that those muscles which are so placed as to oppose this turning backward of the head of the tibia—the tensor fascia, augmented by the biceps and the ilio-tibial band—are subjected to severe strain, and become swollen and sensitive. This explains the pain in the upper and outer part of the thigh, which is a frequent symptom of weakfoot. Finally there is an exaggerated inward rotation of the thigh—an ineffectual attempt to maintain the integrity of the mechanism for locking the knee-joint. It results in irritation of the sacral nerves from strain of the external rotators at the hip. The sacral irritation shows itself in the tenderness and tonic contraction of the gluteal muscles already noted.

The pains at the inner side of the knee-joint are probably due to the strain thrown upon the internal lateral ligaments as a result of keeping the legs widely separated. Widely separating the limbs appears to be due to an involuntary effort to counteract the displacement downward and inward of the astragalus. Local pain occasionally results from an impingement of the displaced external malleolus upon the os calcis. Pain at the inner side of the foot is due to repeated sprains of the calcaneo-scaphoid and associated ligaments, while the sensitiveness at the middle of the heel is due in part to strain of the inferior calcaneo-cuboidal ligaments, and in part to the jarring heel-walk peculiar to flatfooted persons. In this way even the most obscure and distant pains which complicate weakfoot are traceable to a mechanical cause.

Etiology.—The statistics showed that 87 per cent of the cases presented a muscular or ligamentous insufficiency as the exciting cause. What then are the predisposing causes, and to what extent may they be controlled? The first and earliest deforming factor is the *tight-pointed stocking.* It is applied indiscriminately to either foot, and crowds the toes together, abducting the foot and forcing the great toe outward into hallux valgus. Thus is removed a natural means of supporting the inner arch and preventing the foot from rolling over inward. The downward push of the great toe is estimated at twenty pounds. In hallux valgus it is lost, and the patient walks off the side of his foot. Stockings should be right and left, for the same reasons that shoes are right and left. They should not fit snugly, and ideally there should be a separate compartment for the great toe. It has been suggested to make this compartment by introducing a piece of wood the size of the great toe into the stocking, and slitting the latter down for the requisite distance. The wood would then be withdrawn and the edges of the slit sewn up separately.

Another important deforming factor is the weight of the bedclothes. Eight hours in twenty-four are spent in bed, and during those eight hours, when the patient is asleep and the muscles relaxed, no attitude can be assumed in which at least one foot is not being pushed, by the weight of the bedclothes, into abduction and pronation. Theoretically beds should be provided with "cradles" for removing the weight of the bedclothes from the feet. This need becomes imperative where patients are confined to bed for long periods of time by wasting diseases.

The third and most important deforming factor is an improper shoe. An examination of the foot to determine the attitude in which it can best do its work will show how a shoe should hold the foot, or, at least, the attitude which it should permit the foot to assume. An examination of any commercial shoe in view of the conclusions reached will throw a flood of light on the etiology of weakfoot. The foot normally presents an outer arch, an inner arch, and a so-called transverse arch. In the tarsus this transverse arch partakes more of the nature of a flying buttress, since it has no internal abutment. The os calcis, cuboid, and two outer metatarsals form the outer arch. It is low, strong, inelastic, and well adapted to weight carrying. The inner arch is formed by the os calcis, the astragalus, the scaphoid, three cuneiform bones, and three inner metatarsals. It is high, elastic, and adapted rather to balancing the weight on the foot and to giving springiness to the gait than to continuous weight bearing. Adduction of the foot, the position of muscular support, raises the inner arch. It draws the calcis inward and forward beneath the astragalus, flexes the great metatarsal on the first cuneiform, rotates the latter outward, and by a series of thrusts, to be considered later, forces the scaphoid upward, outward, and backward against the head of the astragalus. It produces, too, a sort of longitudinal folding of the forefoot, thereby deepening the transverse arch. Abduction of the foot, the position of ligamentous support, is the reverse of the foregoing. It lowers the inner, obliterates the transverse, and raises the outer arch. The first metatarsal is no longer flexed and adducted, and the restraining thrust of the scaphoid having been relaxed, the pronating forces, which are constant, force the foot into the attitude of weakness. The following experiment was suggested by Sampson to demonstrate that adduction is the natural means of supporting the inner arch:—

"Construct a model out of strips of cardboard which has been bent to represent the arches and fastened together with McGill fasteners, as in Fig. 1. CAD represents the inner portion of the long arch, and CBE the outer portion. AB is the mediotarsal joint. In assuming the adducted and abducted positions the front of the foot moves as a whole, but for the sake of clearness I have represented the association between the anterior portions of these arches by a strip of cardboard, BD, and the transverse arch by another strip, ED. If the inner arch could move unhampered, the point D in assuming the positions of adduction and abduction would move along the arc 1, 2, with AD as the radius from the center A, and the height of the inner arch would not be affected by this movement. But the inner arch is high and elastic, while the outer arch is lower and much more rigid, and the front of the foot moves as a whole, which means that the strip BD is a rigid tether; and D, in assuming the adducted and abducted positions, must move along the arc 3, 4, which is formed by BD, as the radius from the center, B. As the inner arch is elastic, it will adapt itself to this tether, and be shortened and elevated in the adducted position, and lengthened and lowered in the abducted position."

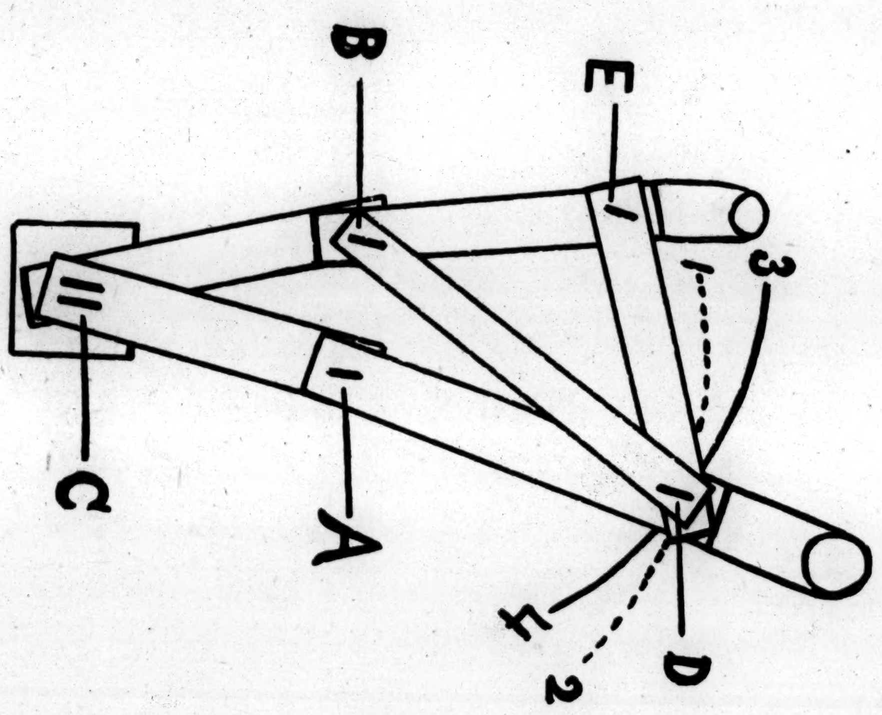


Fig. 1.

Sampson adds that "in adduction the scaphoid slides under and lifts up the astragalus, that is, raises the arch, and in abduction pushes it down, i. e., lowers the arch." He is correct in saying that the adducted position is the position of strength and of muscular support, but adduction of the foot is a much more complicated movement than the experiment would imply. Not merely the mediotarsal joint, but all the joints of the foot proper, take part in it; and it is indissolubly associated with eversion, which raises the anterior part of the inner border of the foot from the ground. To maintain the adduction, and at the same time to apply the whole of the front of the foot to the floor, can only be done by strongly flexing the first metatarsal bone on the first cuneiform. In discussing the principles which should govern the construction of a flatfoot plate, it will be shown that this flexion is the essential factor in maintaining the integrity of the inner arch, besides restoring the transverse arch. The fact now evident is that a proper shoe should hold the foot in adduction, or permit the foot to attain that position. Such a shoe should grasp the foot firmly behind the mediotarsal joint and loosely in front of it. It should exert an outward and upward thrust on the foot at the inner side of the mid-tarsal joint, and inward thrusts at the outer side of the foot, both before and behind this joint. The second diagram represents a shoe of this sort, 1, 2, 3, indicating the disposition of the adducting forces. The shoe should have the same angle of lateral deflection that the foot has, and the inner sole should present a bearing surface slightly in excess of that of the foot. Figs. 3 and 4 show the angles of lateral deflection in an adducted and in an abducted foot. The angle is determined by joining the head of the first metatarsal bone with the point of intersection of a line drawn through the long axis of the os calcis with the line of the midtarsal joint, and may vary between 15 and 35 degrees.

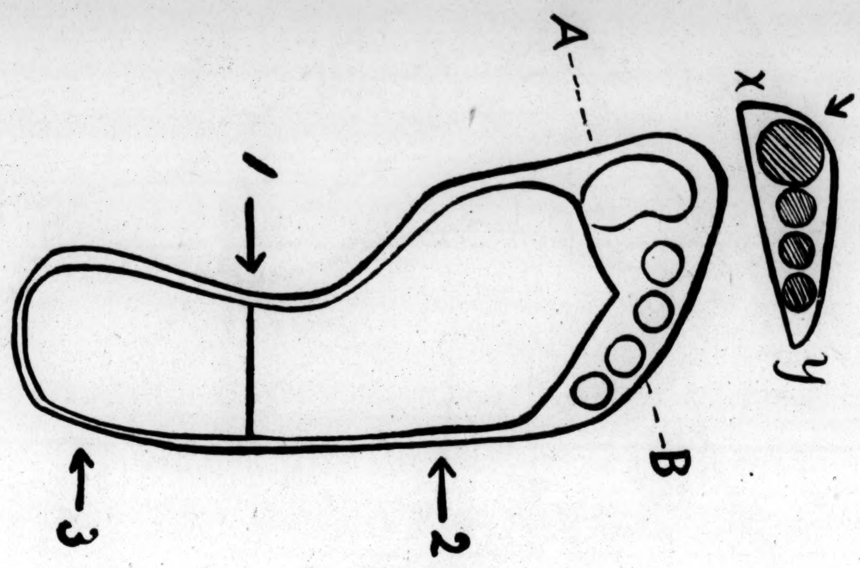


Fig. 2.

In cross section the deepest part of the shoe should be along its inner border, just as it is in the foot. Fig. 2 shows the cross section of such a shoe.

Fig. 5 indicates an otherwise correct shoe, in which the deepest portion is placed nearer the middle line of the shoe. As a consequence the great toe jams, before it can occupy the space provided for it to the left of CD, and is held in abduction by the forces 1, 2, 3, as indicated.

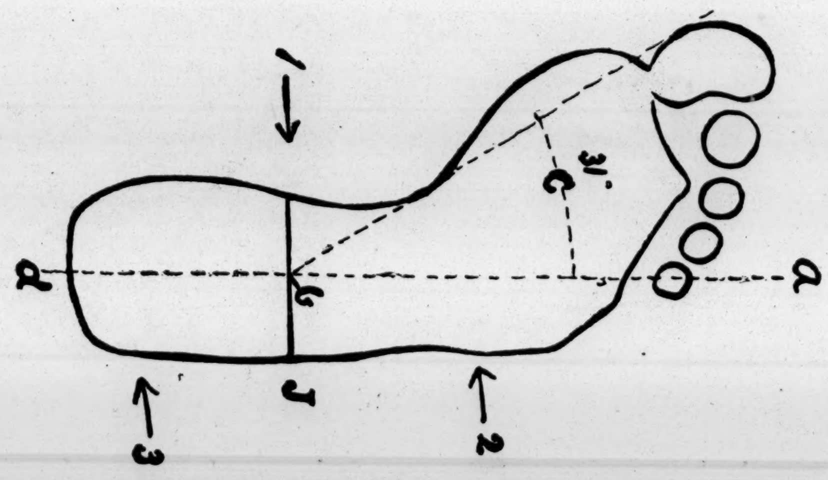


Fig. 3.

Fig. 6 is a diagram of a foot held in abduction by a shoe with too long a shank.

In Fig. 7 is shown how a shoe with an external border concave opposite the mediotarsal joint could hold a foot in abduction. The thrust against the joint would crowd the other side of the foot against the inner border of the shoe, so that at every step the foot would be compelled to spread in abduction.

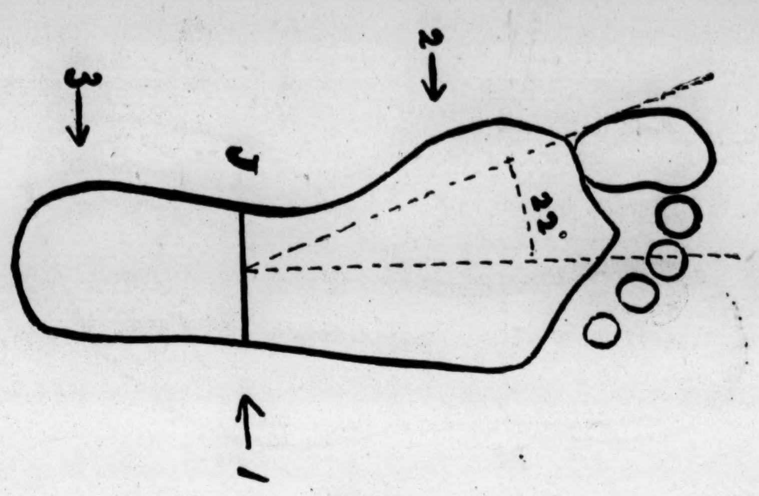


Fig. 4.

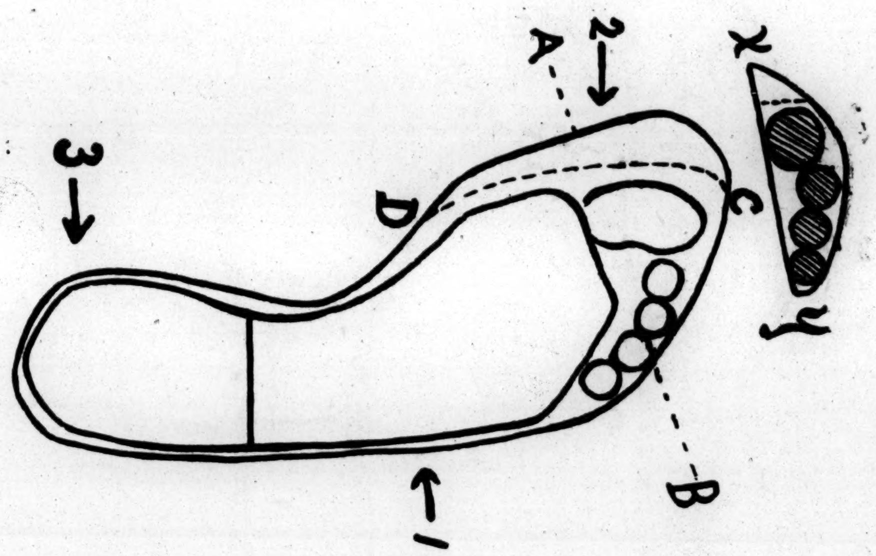


Fig. 5.

Fig. 8 and Fig. 9 show that both the narrow-toed shoe and the broad-toed "common-sense" shoe are deficient in lateral deflection, and hold the foot in abduction. The one advantage of the latter is that it does not cramp the toes.

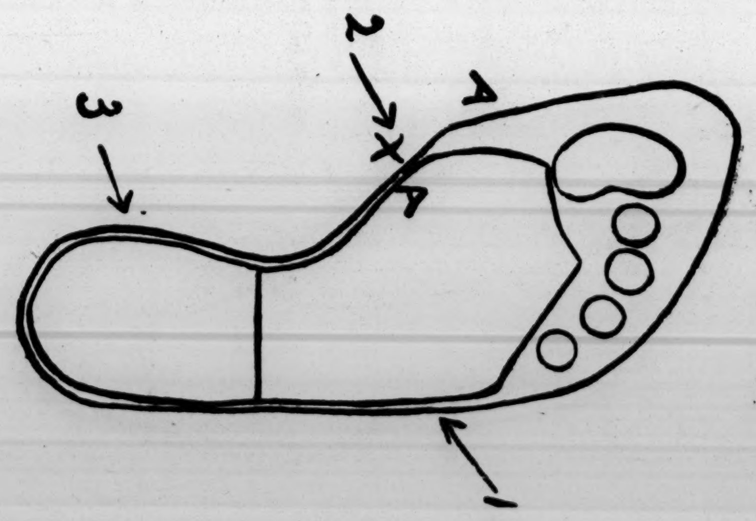


Fig. 6.

Fig. 10 shows a feature of practically all shoes, the so-called "rocker sole." It is introduced by shoemakers to prevent wrinkling of the shoe in walking.

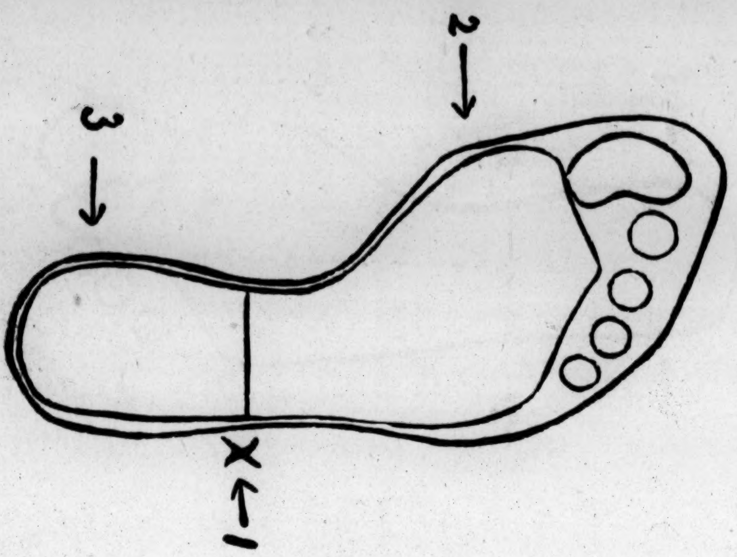


Fig. 7.

Its effect is to maintain the toes in dorsal flexion, thus preventing the downward and backward push which they

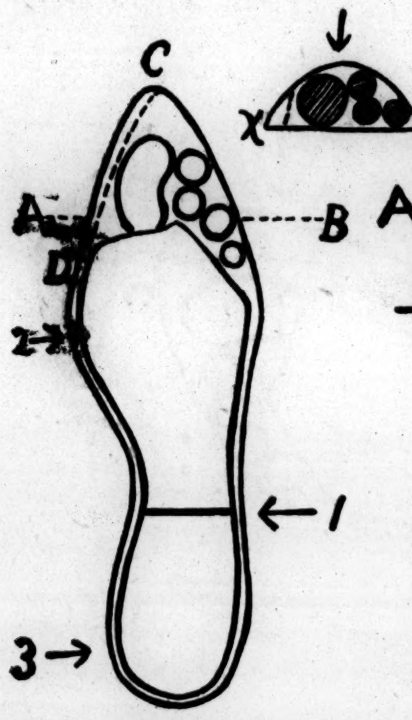


Fig. 8.

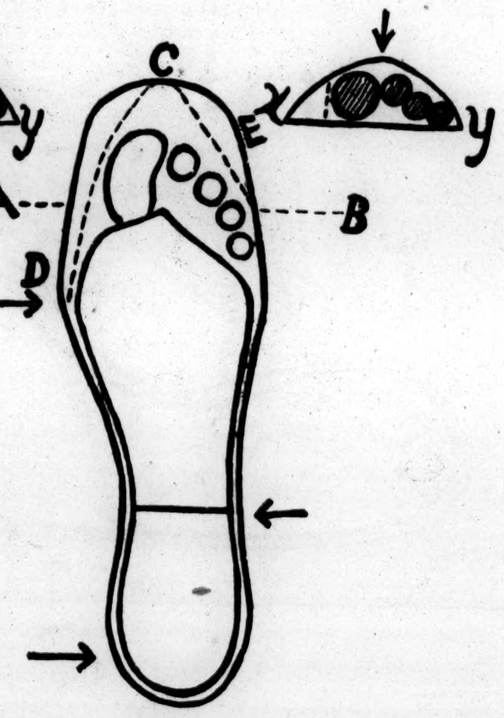


Fig. 9.

normally exert. Another effect of the rocker or "spring" is to flatten the transverse arch.

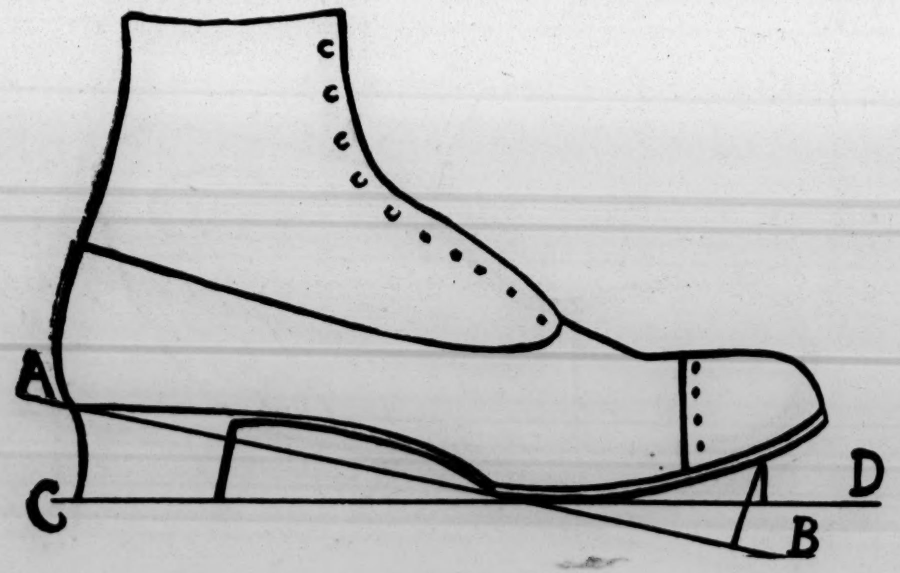
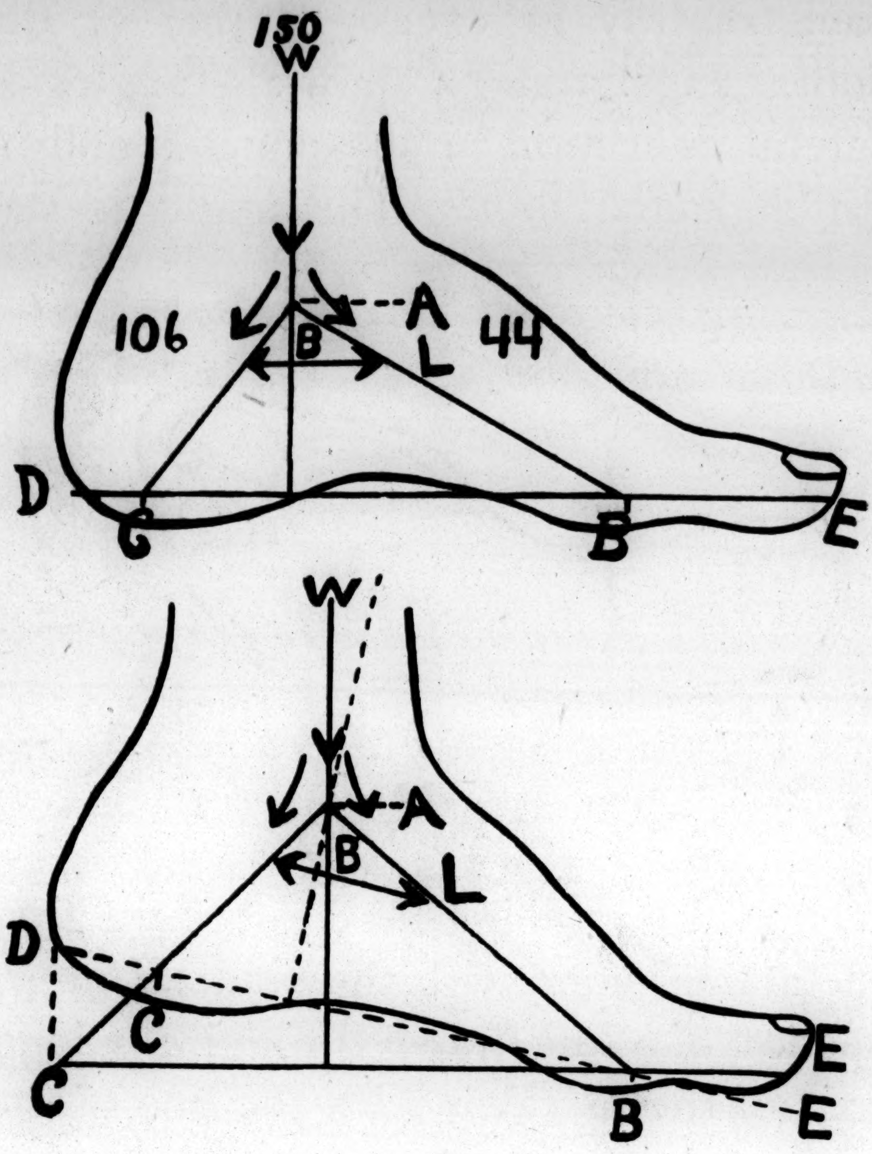


Fig. 10.

The line AB, indicating the direction of the plane of the sole of the foot, shows how a heel augments the rocker element in a shoe.

The inner soles of most shoes are concave from side to side; this is another factor in depressing the transverse arch.

In my opinion, Sampson, of Johns Hopkins, has solved the problem of proper shoes more nearly than any one else. To determine the amount of strain thrown on the ligaments of the foot and the changes in the distribution of weight caused by raising the heel, he resolves the foot into a tripod, through which the body weight is transmitted to the ground. The posterior limb extends from the astragalus to the tuberosity of the os calcis. It is strong, inelastic, more directly beneath the leg, and receives most of the body weight. One anterior limb extends from the astragalus to the head of the first metatarsal bone, and the other from the



Figs. 11, 12.

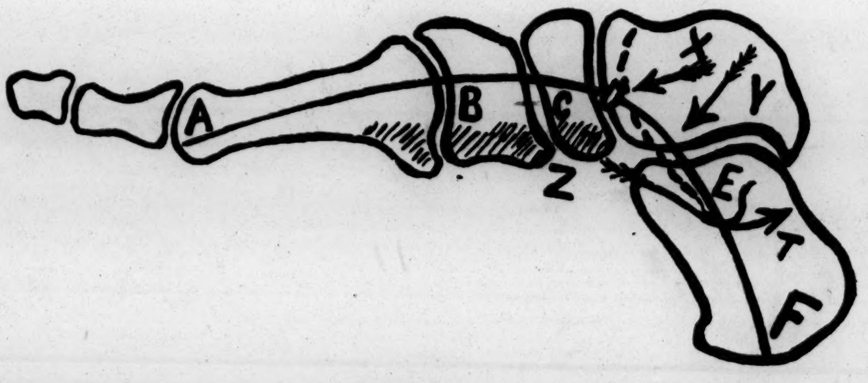


Fig. 13.

astragalus to the head of the fifth metatarsal bone.

It will suffice to consider the first anterior limb only, and to place the ligaments uniting the anterior and posterior limbs one-third of the distance from the top of the arch. He then computes that if a person weighing 150 pounds have an arch of 96 degrees, with a posterior limb of 7 cm., and an anterior limb of 11 cm.,—the conditions which obtain in Fig. 11,—when standing upon one foot, 106 pounds are transmitted down the posterior limb and 44 pounds down the anterior one, while the strain on the ligaments is about 230 pounds. If the posterior limb be increased by the addition of a heel, till it equal the anterior limb in length, 75 pounds will be transmitted down the posterior limb and 75 pounds down the anterior limb, which, however, was only designed to carry 44 pounds; the strain on the ligaments will be increased to 250 pounds, and the transverse arch will be obliterated by the maintenance of the foot in dorsal flexion. On the other hand, if the heel be placed forward, as in so-called French shoes, so that it does not form a direct continuation of the posterior limb, the working angle of the foot will be diminished, and, consequently, the strain on the ligaments less than when there is no heel. The weight will continue to be distributed to the limbs of the arch, so that the shorter does the more work.

The inherent disadvantages of a heel then are: (1) That it causes an improper redistribution of the work to be done, throwing extra work on the relatively weak forefoot; (2) that it diminishes or obliterates the transverse arch and dorsally flexes the toes; (3) that the front of the foot is forced into the shoe; (4) that, except where the heel is advanced, it increases the strain thrown on the ligaments. These, then,—tight stockings, bedcovering, and improper shoes,—are the predisposing causes of weakfoot. To avoid or correct them would represent the prophylactic stage of treatment.

Treatment.—The character of the treatment of weakfoot will depend upon whether it is flexible or fixed in deformity. In the latter case the foot would be unable to respond to the thrusts exerted upon it by a plate, and the attempt to fit a plate to it would result in injury to the soft parts. The best treatment for such a foot is to "break it up" under anesthesia. If difficulty is encountered in doing this with the hands, a leather-covered wooden wedge may be placed beneath the most prominent part of the inner border of the foot, and employed as a fulcrum over which to force the foot into adduction. Adhesions on the outer border and dorsum of the foot are felt, and heard to snap during the operation. The foot is manipulated till unrestricted motion is obtainable in all directions. Division of the tendo Achillis may prove necessary to obtain sufficient dorsal flexion. The foot is finally extended vigorously, adducted, and dorsally flexed to about a right angle with the leg. This draws the os calcis under the astragalus, and causes the scaphoid to give a thrust from below, upward, outward, and backward to the head of the astragalus. In this position the foot and leg are put up in plaster of Paris, and the patient encouraged to walk about on it. Where both feet are affected, crutches will be needed. In this way the patient is accustomed to having his feet in a new position, the reverse of the one to which he has been used. At the same time the overstretched structures on the inner aspect of the foot are relaxed and rested, and the shrunken tissues on the dorsum and outer side thoroughly stretched. The foot should remain three weeks in plaster, except when the tendo Achillis is cut; then six weeks will be required. When the plaster is finally removed, the hot-air oven, massage, and repeated bathings in hot water, are employed to combat the subsequent swelling and stiffness. Thereafter the foot should have passive manipulation daily to the limit of motion in all directions, and, guided by the surgeon's hands, perform exercises directed to restoring the functions of the overstretched muscles. The patient learns to adduct and to evert the foot vigorously many times in succession, in order to exercise the tibialis anticus and posticus, to rise on the toes, at the same time turning them in, and to descend on the outer sides of the feet. This exercise strengthens the calf and the muscles whose tendons pass beneath the sustentaculum tali. Sherman lays stress upon the importance of educating the abductors of the great toe. This is accomplished by placing the feet on the floor, parallel to each other, but a little distance apart, and then toeing vigorously in without moving the outer borders of the feet. It may at first be necessary manually to guide the great toes toward each other.

When the bones of the foot have regained the mutual relations which are normally theirs, it is ready for a brace, but not till then; for the plate is essentially a retentive splint, and not a corrective appliance. To construct a proper brace, it is necessary first to study the mechanical principles of the means employed by nature to oppose the pronating forces and to maintain the integrity of the arch. Once they are determined, the construction of a plate embodying them is a simple matter. The pronating force is the weight of the body, and is, therefore, constant. Through the astragalus it is distributed in two ways to the foot. One is a force, indicated by Y in Fig. 13, which acts directly downward, so that its projection falls to the inner side of the os calcis. If unopposed it would roll the foot over inward. This is the pronating element. The second, X in Fig. 13, is a force acting in an axis directed from above and behind, downward, forward, and inward, through the astragalus, and is applied at the inner end of the mediotarsal joint, anterior to the calcaneo-astragaloid articulation. It is the abducting factor.

Normally, and under favorable mechanical conditions, these forces are successfully opposed by the resistance of ligaments and the action of certain muscles, the resultant of whose pulls is a force which exactly opposes each of them. A properly-constructed plate would be so applied to the bones of the foot as to exert thrusts upon them in the directions of the pulls of the muscles. It would then serve as a splint for the foot, supporting the arches and maintaining the attitude of strength without muscular or ligamentous strain.

The pronating force, Y, is opposed by the upward lift of the muscles whose tendons wind around the sustentaculum tali and pass forward beneath the arch to insert into the bones of the inner row, anterior to the head of the astragalus. The muscles which supinate the foot shorten it by plantar flexion, and extend it on the leg. Their course beneath the sustentaculum tali is indicated by the arrow Z. When insufficient they can be relieved only by a thrust from beneath the arch. To determine that point beneath which an upward thrust best opposes pronation, one end of a lead tape should be pressed against the cuboid and the other passed beneath the foot and out under its inner border. It will be found that voluntary pronation will meet with the greatest opposition when the inner end of the tape exerts a pull upward on the posterior half of the first cuneiform. A lift here then accomplishes what is done by the tibiales, flexors, and adductors of the great toe.

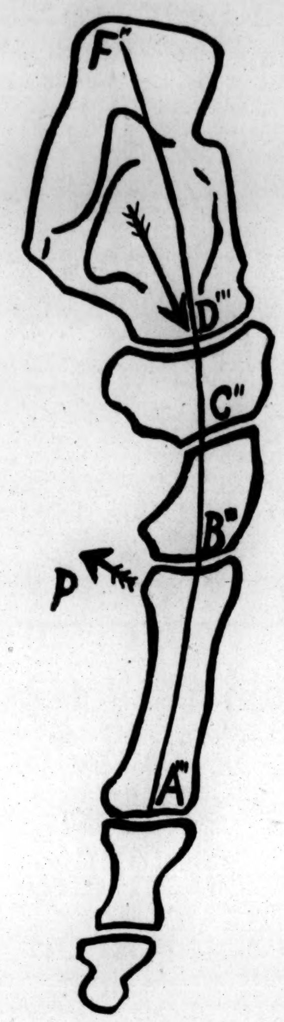


Fig. 14.

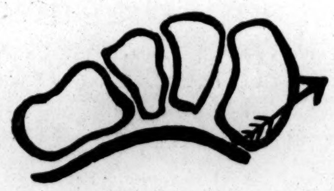


Fig. 17.

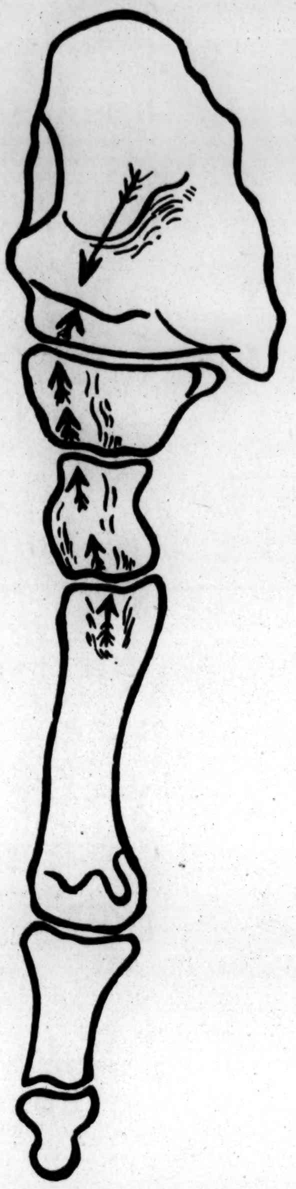


Fig. 15.

The abducting force X tends to depress the arch A'B'C'D'E'F at D.' Fig. 14 shows the effect of this force on the inner row of bones and the assistance it receives from the peroneus longus pulling in the direction of the arrow at P.

Sampson's experiment shows that flexing AB opposes the force X, and must, therefore, exert a thrust which is transmitted to X in a direction outward, upward, and backward. How it does so is revealed by an examination of the tuberosities on the plantar surfaces of the bones of the inner row. Fig. 15 shows the under surface of the inner row of bones, the tuberosities being shaded, and the directions of the thrusts indicated by arrows. The tuberosity at the base of the first metatarsal looks directly downward. Therefore flexion at the first tarso-metatarsal joint must give a thrust directly backward to the cuneiform. The tuberosity of the first cuneiform looks first downward, and at its posterior end upward and inward, while the posterior articular surface looks almost directly inward, best seen in Fig. 16. Consequently the thrust it transmits to the scaphoid is directly outward, backward, and upward, and opposes the pronating force X.

But for this arrangement of the tuberosities, in order to oppose X successfully, it would be necessary to remove A,' in Fig 16, to A.'' In order to keep the proper relations of the tuberosities, the first cuneiform must be maintained in outward rotation. This is normally accomplished by the pull of the tibialis anticus, which keeps the tuberosity at Z' directed inward. If this muscle be relaxed, the pull of the long peroneal tends to rotate the cuneiform inward, thereby displacing the tuberosity and interfering with the directions of the thrusts given.

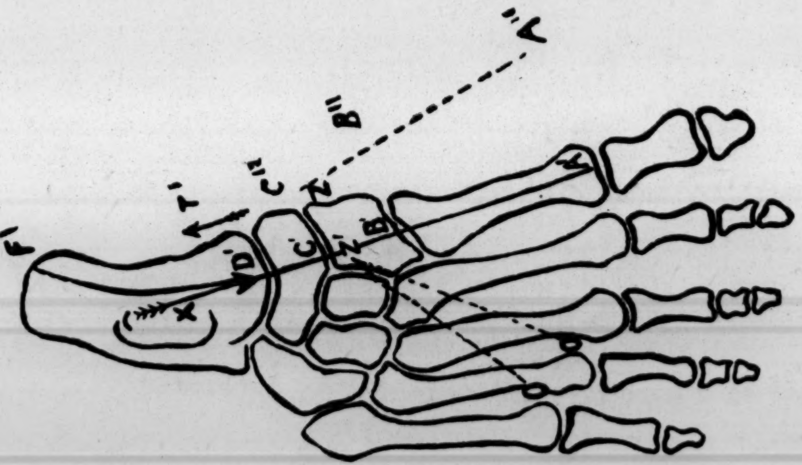


Fig. 16.

So much for the mechanics of pronation. From it is deduced that a proper plate should have its lift beneath the posterior half of the internal cuneiform; that, to keep the bone rotated outward, the highest point of the lift should be placed a little to its outer side, as in Fig. 17; that from this point—Z′ in Fig. 16— it should slope away to nothing at OO, while from the ridge Z′O the plate should incline downward, forward, and inward, to permit of flexion of the first and second metatarsals. The fourth and fifth metatarsals and cuboid remain on the outer slope of the plate. This perfects the transverse arch.

In this way the bones of the foot are maintained in the ideal position, and the plate checks pronation by thrusts which simulate those employed by nature herself.

502 Sutter Street.

CYTODIAGNOSIS, AND ITS APPLICATION IN THE CHILDREN'S HOSPITAL, SAN FRANCISCO.

By Eleanor Fairman Preston, M. D.,
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Cytodiagnosis is the term applied to the method by which Widal and his assistant, Ravaut, propose to determine the etiology of pleurisy, meningitis, and other inflammatory processes occurring in serous cavities. Dr. Harry M. Sherman, orthopedic surgeon of the Children's Hospital, San Francisco, has been interested in its practical application. Cytologic examinations have been made in a number of his cases, tubercular and non-tubercular. As a laboratory guide, a thesis by Ravaut was used, "Le Diagnostic de la Nature des Épanchements Séro-Fibrineux de la Plèvre (Cytodiagnostic)." The majority of Ravaut's observations have been made upon pleural effusions, but his conclusions apply equally to the secretions of all serous membranes.

It is the purpose of this paper to present a digest of Ravaut's book, with a description of his technique, and to give an account of a case examined at the Children's Hospital.

Widal says: "It is clear that if all purely serous effusions presented the same cellular formula, whatever their nature, cytodiagnosis would not exist. The method which I have proposed with M. Ravaut for the study of serous effusions is based upon the fact that the cellular formula varies according to the nature of a sero-fibrinous pleurisy."

It has long been known that the sero-fibrinous fluids of the pleura contain red, white, and endothelial cells in varying proportions. In making cytologic examinations, the purpose has been to determine whether the histologic formula of a pleurisy varies according to its nature. Since the cytologic character of an effusion depends directly upon the anatomic lesion of the serous membrane, the cytoscopic study of the fluid ought to be the most available method of diagnosis. Nor are these researches limited to the pleura; the examinations made upon cerebro-spinal fluid, articular fluid, hydroceles, etc., show the general bearing of cytodiagnosis.

Prior to the investigations of Widal and Ravaut, the same line of research was followed by Ehrlich, Quincke, Fraenkel, and others. But their object was to discover neoplastic cells in cancerous effusions of the pleura. The Polish scientists, Korcgyriski, Wernicki, and Winiarski, established the presence of lymphocytes, polynuclears, and endothelial cells in the pleural fluid. But all stopped short of cytodiagnosis. In their work there was no question of the nature of the fluid, still less of its histologic formula.

Ravaut reviews and condemns as inexact the older methods of investigation, —cultures, inoculation, estimation of fibrin, comparative estimation of chlorides, injection of tuberculin, and tests of permeability of the pleura. Anatomical and pathological examinations alone could in all cases establish positively the presence or absence of pleural tuberculosis. But the cytologic appearance of a pleurisy corresponds to the pleural lesion. Hence the nature of the effusion, the anatomical lesion, and the cytologic formula seem to be intimately connected and dependent upon one another.

The pathology of primary pleuro-tuberculosis has been definitely fixed. An autopsy made upon one of Widal's patients, who died in the course of a right-sided primary pleuro-tuberculosis, corresponded with the results of the cytologic examination. The fluid was purely lymphocytic, and produced tuberculosis in two guinea-pigs which were inoculated. The parietal and visceral pleura were adherent at the level of the apex and at the level of the diaphragm; elsewhere the adhesions were less firm, and towards the middle of the lung were marked only by filaments of fibrin. The fibrinous exudate was not yet organized. When the lung was exposed, it appeared to be covered by a soft, villous deposit, four millimeters thick, which enveloped it like a sac. On section, it was easy to distinguish with the naked eye: (1) The slightly-thickened visceral pleura, as a mottled white line; (2) a grayish membrane two millimeters thick covered with a cushion of fibrin. The parietal pleura presented the same appearance. Tubercles could not be seen with the naked eye. Histologically the classical lesions were found, and the layers revealed by macroscopic examination could be seen still more clearly. The neomembrane was formed of vascular-connective tissue, and contained many giant cells. The pseudomembrane consisted of fibrinous layers. Péron found the bacilli of Koch in the pseudo-membrane, but Ravaut and Widal have found them neither in this layer nor in the giant cells of the neomembrane. This description justifies the name of "sero-fibrinous tuberculosis with a neomembrane," which Ravaut applies to this form of pleural tuberculosis.

There is another more common form, the pleural tuberculosis of consumptives, secondary to the pulmonary lesion. These two forms differ cytologically and anatomically. In the second type the fibrinous coat does not exist. There is a thin vascular-connective neomembrane, with caseous centers, which are sometimes visible to the naked eye, and are rich in bacilli and giant cells. A step further, the thickening of the neomembrane, the accentuation of its fibrocaseous character, and we have tubercular empyema. There is, then, an anatomical bond between the apparently sero-fibrinous pleurisy of the consumptive and tubercular empyema. This is also cytologically true. Polynuclears are found in both, and by their increase determine the change from the sero-fibrinous to the purulent type.

In pleurisies which occur in heart disease, Bright's disease, etc., the neomembrane is never found. The pleura is thin and transparent. Histologically it appears normal, except at some points, which are slightly thickened, and which correspond to old fibrinous deposits.

In septic pleurisies, due to pneumococcus or streptococcus infection, the pleura is scarcely altered. Above the hepatized regions there are fibrinous deposits, which are easily detached. Everywhere else the pleura appears normal. But if these pleurisies become purulent, the fibrinous deposits spread, organize, and form a pyogenic neomembrane, whose thickness varies with the duration of the pleurisy. Ravaut thus recognizes tubercular pleurisy, which has a neomembrane, and non-tubercular pleurisy, which has none.

Comparing cytologic and anatomical examinations, it is found that effusions occurring in pleurisies which have a neomembrane never contain endothelium, while the liquid is rich in endothelial cells when the neomembrane is not present. As soon as the neomembrane is formed, it hinders endothelial desquamation. In effusions without a neomembrane, the fluid alters the endothelium, which desquamates more easily. By the presence or absence of endothelial cells, a diagnosis may be formed which is as valuable as an anatomical examination. In primary pleuro-tuberculosis there are found only mononuclear elements. Endothelial cells and lymphocytes characterize the pleurisy of Bright's disease. In pneumococcic pleurisies there are polynuclears in the beginning, but the endothelial cells are of more importance. It is necessary, therefore, to establish the significance of lymphocytes and polynuclears.

Consider the pleura as a great lymph space. The smallest serous exudate in its cavity will contain lymphocytes. They, with the endothelial cells, remain the only elements in the liquid, until some infectious or toxic cause compels the presence of other elements endowed with phagocytic powers. It is under these conditions that polynuclears appear by diapedesis. Here, as elsewhere, the polynuclear is an active element, in contrast with the lymphocyte, which may be considered as a passive element. The exudation of liquid and of lymphocytes is a mode of pleural reaction when the irritation is not so acute as to necessitate the presence of polynuclears. These facts form a general law, which is applicable to all serous membranes. The lymphocyte corresponds to a subacute or even chronic irritation, the polynuclear to an irritation which is acute.

Technique.—The technique of a cytologic examination will now be reviewed, together with the findings which are typical.

Almost all these effusions are fibrinous. The fibrin coagulates quickly and entangles the cells. Hence, the first step is defibrination. The cellular elements must be concentrated, and only as much liquid retained as is necessary for the making of cover-glass preparations. If there is too much liquid, the albumen, abundant in these effusions, will coagulate, forming upon the slide a mass which will spoil the staining and make the examination almost impossible. The ideal is to have the greatest number of cells with the least liquid in the smallest space possible. This is accomplished by centrifugation and decantation. The fluid is taken aseptically. It may be drawn with an aspirator or a trocar, by exploratory or evacuating puncture, directly into the defibrinating flask or into any clean receptacle. It should be done quickly, to forestall coagulation. The quantity required is 15 to 20 c. c., on an average, but an examination can be made with 1 to 2 c. c.

Defibrination.—This may be done immediately, or the liquid may be collected and kept in a test-tube.

Immediate Defibrination.—If there is enough liquid, it is shaken in a flask with glass beads as large as peas. But if there are only one or two c. c., a test-tube is used with smaller beads. Large beads are preferable, because small ones may be lost in the coagulum. If the effusion is very fibrinous, a coagulum appears in a few minutes. It increases until it forms a true clot. Sometimes, instead of a homogeneous mass, many little coagula float in the liquid. The time necessary for defibrination varies from fifteen minutes to an hour or more.

Delayed Defibrination.—When the fluid is kept in a test-tube for twenty-four to forty-eight hours, the coagulum forms spontaneously, and includes most of the cells. The liquid and coagulum are emptied into a flask with beads, and shaken for ten minutes. The clot is broken up and the cells liberated. The examination should not be made after forty-eight hours, because the elements alter quickly. This is emphasized when the fluid has not been taken aseptically, for it then becomes a good culture medium, and the cells disintegrate. In both immediate and delayed defibrination the fibrin is to be removed, leaving the liquid which holds the cells in suspension.

Centrifugation and Decantation.—Centrifugation is complete when a drop of the liquid examined on a slide contains no cellular elements. A clot has then formed at the bottom of the tube. The liquid is poured off, or decanted with a pipette. By means of a platinum wire or closed pipette, the clot is diluted in the liquid which remains, until the mixture has almost the fluidity of blood. It is only by experiment that one learns the quantity of fluid that one should keep; there is always a tendency to dilute too much.

Spreading upon the Slide.—Upon a series of very clean slides, small drops of the dilution are placed. The drop is not spread upon the slide, as blood is spread, with cover-slips. With a platinum wire or the end of a closed pipette, it is rubbed on the glass in larger and larger circles. If the spreading has been well done, the preparation, though a little thicker, will resemble a preparation of blood. The clot thus spread dries quickly. An examination of a drop under the microscope, before drying, will often reveal details which can not be brought out by staining.

Fixing and Staining.—The same fixations and stains are used as in blood preparations. Alcohol and ether are employed in fixing preparations for hæmateine and eosin; heat for Ehrlich's triacid. The elements found are those which are seen in blood, normal and pathological. But in addition there is a special element of importance, the endothelial cell. Usually these cells are united two by two or in sheets. They come from the endothelial desquamation, which occurs at the beginning of almost all pleurisies. These cells persist during the course of the pleurisy, or they separate and disintegrate.

Ravaut classifies pleural effusions as:—

A. Tubercular Pleurisies.

B. Non-Tubercular Pleurisies.

1. Aseptic (occurring in heart disease, Bright's disease, and associated with neighboring lesions).

2. Septic (due to streptococcus infection, pneumococcus, etc.).

C. Pleural Eosinophilia.

CYTOLOGIC FORMULAE.

A. TUBERCULAR PLEURISIES.

Sero-fibrinous pleurisies of tubercular origin present two different types, primary and secondary. These two forms of pleurisy have the same nature, and are distinguished only by different reactions. In primary pleurisy the organism responds to an apparently primary infection by bringing all its defensive resources into play. The pleural fluid exercises its germicidal power, the new pleural formations try to arrest and circumscribe the microbic infection, and the fibrin entangles the bacilli in its meshes. The lesions are repaired and cicatrize, uniting the parietal and visceral pleuræ. But in secondary pleurisy the infection seems to be continued either by communication with pulmonary lesions or by the opening of subpleural tubercles into the pleura. The organism has neither opportunity nor strength to react. The neomembrane is thin. The liquid, which is without fibrin, is filled with virulent bacilli, and the cells contained in it quickly die.

1. *Primary Pleuro-Tuberculosis* is characterized by the almost exclusive presence of lymphocytes. They are always mixed, however, with some red cells. This extreme lymphocytosis enables us to make an etiologic diagnosis at once. Sometimes there are occasional mononuclear cells, always altered, and staining badly. They soon disappear, and are of no significance. If the effusion is examined as early as the sixth to tenth day of the pleurisy, a few polynuclears may be seen, never exceeding 10 per cent. In some of these cases, staphylococci have been found. They disappeared quickly, and with them the polynuclears, so that a double infection is to be inferred. Sheets of endothelial cells have never been found in any stage of the effusion.

2. In *Secondary Pleuro-Tuberculosis* the fluid contains comparatively few cells. They are altered, irregular, and filled with vacuoles and refractive granules, which turn black in the presence of osmic acid. In stained preparations one recognizes with some difficulty a few red cells and amorphous masses which stain uniformly with nuclear reagents, and which represent altered leucocytes, especially polynuclears. Many of these can be determined only by the neutrophilic granules stained with Ehrlich's Triacid. There are occasional mononuclear elements, but endothelial cells have never been found. The cytologic formula at the beginning of the secondary tubercular pleurisy is not the same as in the later stages. In the one case where Ravaut made an early examination, there were many polynuclears, some lymphocytes, and a few isolated mononuclear cells. A reexamination ten days later showed that the effusion was almost purely lymphocytic, comparable to that of primary pleuro-tuberculosis. It is probable that all cases of secondary pleuro-tuberculosis show this formula in the early stages. The microbic infection, resulting from the rupture of a subpleural tubercle, or from the opening of a pulmonary lesion into the pleura, may be more intense than in primary pleuro-tuberculosis, and determines the presence of polynuclears. If the organic reaction is not sufficient to combat the infection, the polynuclears alter and disappear.

B. NON-TUBERCULAR PLEURISIES.

I. PLEURISIES APPARENTLY ASEPTIC.

a. *Pleurisies of Bright's Disease and Heart-disease.*—Whether we consider these pleurisies as being of toxic origin, of congestive origin, or of mechanical origin analogous to a pleural edema, we always find in the effusion the same characteristic elements,—endothelial cells. They form sheets composed sometimes of eight to ten cells. The nuclei are distinct, but the outlines can not be traced. If the cells are not in sheets, they are united two by two. There is a sort of constriction at their point of union, or the second cell seems to be only a budding of the first. The eosin-hæmateine stain shows best the character of the cells: The homogeneous protoplasm becomes rose-colored, the nucleus violet, but both stain badly. When the effusion is in the earliest stages, and corresponds to the purest type of hydrothorax, the endothelial sheets are so numerous that they cover almost the whole field of the microscope. Later they diminish in number, and are mixed with lymphocytes. The cells become dropsical, wither, and die. The presence of endothelial cells, even when reduced to two or three cells, is an important diagnostic sign. They have never been found in tubercular pleurisies, though single cells have been seen. In an effusion occurring in heart-disease or Bright's disease, even though it is rich in lymphocytes or polynuclears, the presence of endothelial sheets shows that the condition is not tubercular.

b. *Pleurisies Associated with Malignant Tumors of the Lung.*

Case 1. The pleural fluid contained endothelial sheets, lymphocytes, some polynuclears, and many red cells. The autopsy showed a generalized carcinoma of ovarian origin.

Case 2. The effusion was slightly hemorrhagic and very fibrinous. It contained endothelial sheets, lymphocytes, red cells, and large cells filled with refractive granules and vacuoles. These characteristic elements were larger than endothelial cells. In some the nucleus showed the figures of karyokinesis; in others it seemed to be formed of tangled threads. These cells at once suggested the neoplastic nature of the effusion. They probably fell into the pleural fluid only after the rupture of the gorged lymphatics.

2. SEPTIC PLEURISIES.

The term septic should be applied to non-tubercular sero-fibrinous pleurisies only when the presence of pathogenic microbes has been established by means of slides or cultures. If the pleurisy remains sero-fibrinous, the microbes lose their virulence and disappear, and the effusion is absorbed. But if the organic reaction is insufficient, the pleurisy quickly becomes purulent.

a. *Pneumococcic Pleurisies.*—The effusion contains polynuclear neutrophiles, their number being in proportion to the number and virulence of the bacilli. In the beginning of the infection there are also endothelial sheets and scattered endothelial cells. These alter quickly, separate, and disintegrate. Some of them, more resistant, play the role of macrophagi. There is, moreover, a phagocytosis exercised by the polynuclears upon the bacteria. The pleurisy may develop in two ways. If it progresses towards a cure, the microbes disappear, the polynuclears become few, and are replaced by lymphocytes. But if the bacilli multiply, the polynuclears increase to the point of purulence. Other elements are seen which are hard to identify, but which are only degenerated polynuclears. The nucleus alters and breaks up, passing through the phases of karyokinesis. One often sees a protoplasmic mass, having in its center one, two, three, or more little globules representing the nucleus. If the protoplasm is retracted, it is easy to confound these altered polynuclears with lymphocytes. But Ehrlich's triacid will reveal numerous neutrophilic granules around the globule or globules. It is necessary to be forewarned of these transformations in order not to mistake polynuclears for lymphocytes or neutrophilic mononuclear myelocytes.

These facts represent the results of the observations made by Ravaut upon fourteen cases of pneumococcic pleurisy.

b. *Streptococcic Pleurisies.*—The pleural effusions of three cases were examined. Of these, two contained only polynuclear leucocytes. The third contained polynuclears and isolated endothelial cells.

c. *Typhoid Pleurisies.*—In typhoid the effusion is partly hemorrhagic, partly serous. If hemorrhagic, the fluid contains fifty to eighty of neutrophilic polynuclears, with lymphocytes, scattered endothelial cells, and many red cells. If serous, it contains many lymphocytes, some red cells and polynuclears, and endothelial cells, which are scattered or in sheets.

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d. *Pleural Eosinophilia.*—Ravaut had seen four cases:—

Case 1. Pleural eosinophilia in an effusion occurring in the second stage of syphilis: Endothelial cells, 35; lymphocytes, 22; large mononuclear eosinophiles, 37; large mononuclear neutrophiles, 6.

Case 2. Pleural eosinophilia in typhoid fever: Polynuclear eosinophiles, 23; lymphocytes, 66.6; mononuclear and endothelial cells, 10.4.

Case 3. Pleural eosinophilia in pulmonary tuberculosis: Polynuclear eosinophiles, 54; polynuclear neutrophiles, 6; lymphocytes, 46.

Case 4. Pleural eosinophilia in a case where no diagnosis was made. The liver was enlarged, as were the inguinal and axillary glands, but the cultures were negative: Polynuclear eosinophiles, 14; lymphocytes, 86.

The significance of pleural eosinophilia as a symptom has not yet been determined. It is of interest that the pleural eosinophilia does not seem to correspond with an eosinophilia of the blood. In all these cases it seems to be a special localization. The facts supplied by cytoscopy have shown that the cellular elements are the evidences of the pleural reaction. They may be examined at any stage of the disease, and they furnish indications whose interpretation may not be easy, but whose application is of immediate clinical significance. Thus regarded, cytodiagnosis should interest the histologist and biologist as much as it assists the clinician.

ILLUSTRATIVE CASE.

Marguerite W., aged six months, Orthopedic Service of the Children's Hospital, San Francisco. Admitted Jan. 6, 1902; died March 28, 1902.

The case in question was one of spina bifida and internal hydrocephalus. The tumor was at the level of the fourth lumbar vertebra, and measured about 15 cm. long by 10 cm. broad. The cranial enlargement became noticeable at the end of January, and increased from that time until February 20, but at the last measurement, taken March 18, the head had slightly increased in size. The measurements were as follows:—

	Occipito-Frontal Circumference.	Occipito-Mental.	Sub-occipito-Bregmatic.
Jan. 23.	44.5 cm.	46.7 cm.	41.5 cm.
" 28.	45.3 cm.	47.5 cm.	4.5 cm.
" 30.	45.3 cm.	....	4.5 cm.
Feb. 1.	45.5 cm.	....	41.5 cm.
" 6.	48.3 cm.	....	42 cm.
" 13.	48.5 cm.	....	42.5 cm.
" 20.	48.2 cm.	49.5 cm.	44.5 cm.
Mar. 18.	46.7 cm.	48.5 cm.	42.5 cm.

The child's face was eczematous, as were the external aspects of the legs; and her digestive processes were irregular, with a tendency to constipation. The weight decreased from 12½ pounds, on January 28, to 10¾ pounds, on March 27. There was an intermittent conjunctivitis and a chronic nasal discharge. The tumor began to show superficial ulcerations a few days before death. Three spinal punctures were made, and the cerebro-spinal fluid drawn from the tumor, the quantity aspirated being 30 c. c., 16 c. c., and 8 c. c. respectively. After aspiration, 16 c. c. of Morton's fluid (potassium iodid, 2 grams; iodin, 0.65; glycerin 29.57 c. c.) were injected into the sac. The tumor became flaccid, but there was no sign of consolidation. After each puncture a cytologic examination was made, and a fourth examination was made of the fluid which was obtained by aspiration two hours after death. As a rule, the temperature and pulse were regular and normal, but there occurred several times a rise of temperature and increase in pulse-rate, which were of interest in connection with the cytologic examination, and for which no cause was clinically apparent. February

9 and 10 the temperature rose to 39° C., and the pulse became 160, and irregular. No puncture was made at this time. March 5 the temperature was 41.8° C. It was reduced to normal by an alcohol sponge and ice cap. When the first puncture was made, on March 8, the temperature was normal, but the next day it rose to 40° C. The temperature was 37.8° C. on March 15, at the time of the second puncture. The last puncture was made on March 27, when the temperature had risen to 39.4° C. It continued to rise until it reached 42° C., at 10 P. M., March 27, where it stayed until the child died, at noon the next day. The pulse was irregular and faint, and could not be counted. The fluid for the last cytologic examination was drawn two hours after death.

No autopsy was made, but the tumor was removed and examined. The spinal column was deficient below the level of the fourth lumbar vertebra. Contrary to the usual rule, the whole spinal cord did not enter into the formation of the sac. The anterior columns seemed to follow their usual course down the anterior wall of the sac, while the posterior columns diverged from them and spread out over the posterior wall. About 40 c. c. of fluid were aspirated from the tumor before its removal from the body.

The first cytologic examination was made on March 8. Temperature at this time was normal, but it had been 41.8° C. on March 5, and there had been a previous rise of temperature on February 9 to 39° C. The examination was incomplete, no differential leucocyte count being made. But leucocytes and endothelial cells were numerous, the latter appearing singly and two by two, not in sheets. A few red blood-cells and blood-plates were present. But the point of greatest interest in this examination was that the stained preparations showed a few diplococci, and the cultures proved to be pure pneumococci. At the second puncture, March 15, the temperature was normal. Leucocytes were few, much less numerous than in the first specimen. Some endothelial cells were still present. But no bacteria appeared either on the slides or in the cultures. Differential count showed polynuclear leucocytes 62 per cent and lymphocytes 35 per cent. No large mononuclears nor eosinophiles were found. On March 27, when the last puncture was made, the temperature had again risen to 39.4° C., and continued to rise until death. In this specimen small white coagula formed at once, and floated in the fluid. The previous specimens had been clear. Endothelial cells were few. Leucocytes were exceedingly numerous, more so than at any former examination, and consisted of lymphocytes 74 per cent and disintegrated polynuclears 25 per cent. The latter were at first thought to be large mononuclears, but neutrophilic granules were seen around the nucleus, which was sometimes broken up into two or three or more. Much debris was present, representing the last stage of polynuclear degeneration.

A cytologic examination was made upon the fluid, which was withdrawn two hours after death. It was milky, and filled with floating coagula. The field was crowded with leucocytes, and endothelial cells were more numerous than before. A few pneumococci were seen, and many large, thick bacilli, staining irregularly. Cultures showed pneumococci, staphylococci, and the same large, irregular bacilli, which could not be differentiated from the bacillus coli communis. These could not have been other than migrated colon bacilli. While the presence of the colon bacillus has not been established in the cerebro-spinal fluid, there is no reason why it should be found there within two hours after death. The cerebro-spinal canal is a great, open lymph-space, and not a closed sac, as is the lymph-sac of the frog. Since the colon bacillus is known to migrate into other tissues even before death, there is no reason why it should not appear in the cerebro-spinal fluid as well. The writer is convinced that this is what actually happened. Differential count gave 76 per cent of lymphocytes and 24 per cent disintegrated polynuclears. If the abundant debris represented polynuclears, the percentage would be changed.

The cytoscopy points to a pneumococcic infection. According to Ravaut, the fluid in the earlier stages of such an infection should contain endothelial cells and polynuclears, which corresponds with the first examination made; that, later, lymphocytes may appear, if the infection becomes less virulent; and that both polynuclears and endothelial cells disintegrate in the course of the diseases, until, from the broken nuclei and retracted protoplasm, they are readily mistaken for large or small mononuclear lymphocytes. In this case no macrophagi were detected, and no karyokinesis was seen. The great increase in the number of leucocytes during the last days indicates an approach to purulence. This was coincident with the appearance of pus in the stools and the last febrile movement.

The points of interest in this case are:—

1. The fact that its cytologic formula corresponds with Ravaut's findings in pneumococcus infections.

2. The appearance of pneumococci in the cerebro-spinal fluid, coincident with a rise in temperature and increase in leucocytes.

3. The appearance of the bacillus coli communis in the cerebro-spinal fluid two hours after death. This is believed to be the first recorded instance of this observation.

Such are the facts presented by the examination of a single case in the study of Widal and Ravaut's new method of "Cytodiagnosis."

INTESTINAL ANASTOMOSIS: DEMONSTRATION OF CONNELL SUTURE.

By Thomas W. Huntington, M. D.

Read before the Northern District Medical Society, June, 1902.

As an introduction to a formal discussion, your attention is invited to a matter of extreme surgical importance, which has a direct bearing upon the subject chosen for this occasion.

With due deference to the research worker, it must be confessed that clinical and laboratory methods are inadequate for an early identification, location, and definition of important visceral lesions. Valuable time is wasted in speculation, while vague suspicions slowly develop into appalling realities, and the opportunity for rational treatment is hopelessly lost. In my opinion the time has come when the wisdom of an "exploratory incision" should be conceded without cavil, and the step urged to the limits of propriety. Personally I am prepared to advise a diagnostic incision whenever symptoms, significant and intractable, suggest the presence of pathologic conditions, that may be amenable to surgical measures. Such a step, deliberately planned, while the patient's vitality is well maintained, and executed under the usual precautions, is of small importance in point of risk, while it may possess immense clinical value. I am fully aware that the term "exploratory incision" is regarded by some with disfavor, and that by the ultra conservative it is wholly discredited, as a cloak of ignorance and a mask of recklessness. Furthermore, it is to be hoped that this plea for the legitimacy of what I regard an indispensable official aid, will not be interpreted as a more or less ingenuous argument in support of the fallacy that operation may take precedence over diagnosis.

My contention is that when within reasonable limits the clinician and the laboratory worker fail in the solution of a diagnostic problem, it becomes the duty of the surgeon to uncover tissues and organs for purposes of inspection. Digressing still further, and speaking particularly to the general practitioner, it is apparent that there are phases of disease, constantly observed by the surgeon, which are rarely seen and faintly appreciated by the physician; and there can be no doubt that at the elbow of a conscientious, skilful surgeon there is an excellent opportunity to study gross pathology, where face to face with living material he can observe conditions which aptly illustrate the ever varying stages of disease. Israel has expressed this thought very impressively: "Nothing in nature," he says, "is absolutely constant; all phenomena that come to our consciousness through the exercise of the senses, proceed from changeable objects; all nature is in motion."

To me the expression of pathologic conditions, as seen upon the living, possesses a significance of infinitely greater clinical value than flows from the finished picture at the autopsy. Kehr, in his admirable work on "Gall-stone Disease," emphasizes this point as follows: "Diagnostic acumen, the finest perceptive powers, experience, and practice are qualities and gifts of the doctor which are not to be underestimated; yet they avail him nothing if his knowledge of the pathological processes under which the disease processes develop are hazy and defective. Unfortunately for the practitioner of internal medicine, the study of these processes as they develop in gall-stone disease is extraordinarily impeded, since he is for the most part thrown upon his observations at the bedside and the autopsy table.

"The genius who presides at the postmortem, with delightful accuracy locates the initial seat of a destructive process, and traces its progress from tissue to tissue, from organ to organ, from beginning to end. But he who seeks to play an important role in the real struggle with disease, must display mastership in the interpretation of early symptoms; he must plan with consummate skill, and execute with a boldness, that finds its limitations only in sound judgment."

The bearing of the foregoing comments upon bowel anastomosis is obvious, and there can be no doubt that future improvement in statistics will depend very largely upon promptness and accuracy in diagnosis. Faults in operative technic seriously jeopardize life, but eleventh-hour operations, undertaken when the patient is in extremis, will, under any plan of treatment, be attended by an appalling mortality.

It is unnecessary, for the purposes of this paper, to enter into a comparison of the merits of the various methods of anastomosis, either by suture or other device in vogue at the present time; and I have chosen the one which, in a majority of cases, will be found eminently satisfactory.

The essentials of a correct and logical method in this department of surgery depend upon three cardinal factors. First. Approximation of serosa to serosa. Second. Fixation, which is mechanically unassailable under reasonable limitations. Third. Imperviousness of the suture line. These requirements seem to be met by the plan of F. Gregory Connell, of Chicago, and were set forth by him with clearness and precision at the meeting of the American Medical Association, in 1901.

The chief advantages of the Connell suture may be enumerated as follows: First. Accurate approximation of the sero-serous layers. Second. The suture knot lies wholly within the lumen of the bowel. Third. All layers of the bowel, serosa, muscular, sub-mucosa, and mucosa, are included within a loop suture. Fourth. Less danger of infection through stitch-hole leakage. Fifth. An unyielding stitch, which precludes the possibility of slippage. Any suture which engages only the serous and muscular coats is open to the very serious criticism, that it will yield to the slightest tension, and expose the patient to the dangers of peritoneal infection. Sixth. No foreign body in the lumen of the bowel to cause temporary or partial obstruction.

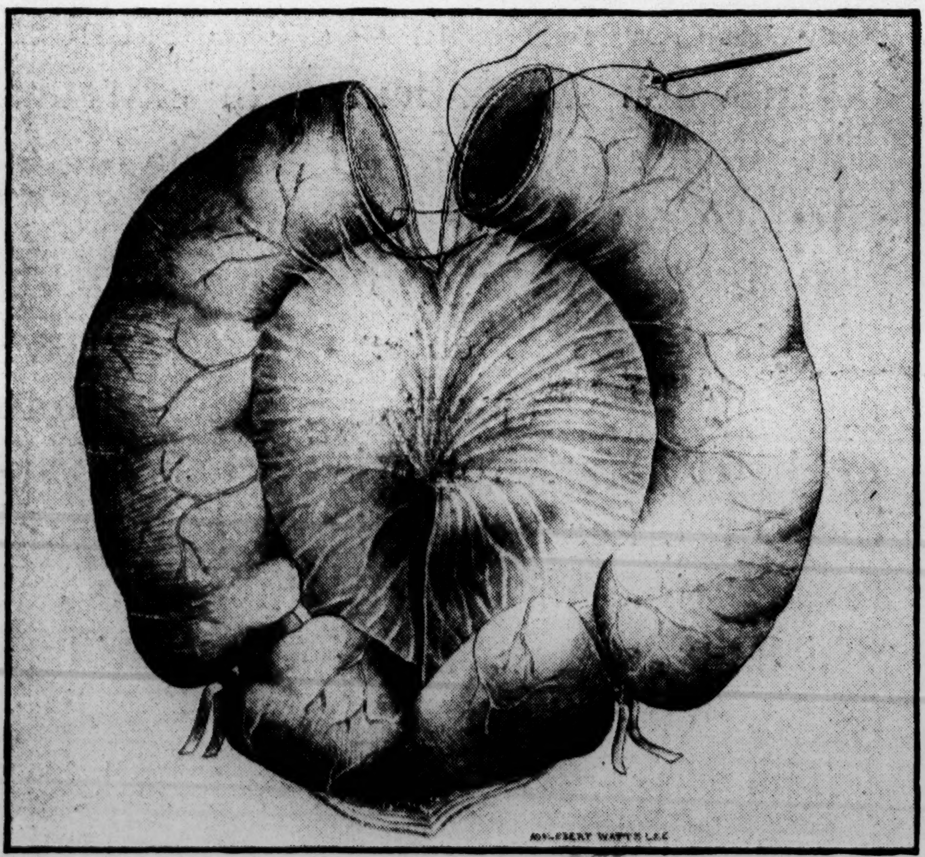

Fig. 1.

The advantage of placing the knot within the lumen is apparent from the fact that the current of capillarity being toward the knot, danger of infection from this source is eliminated. We thus have a bowel anastomosis possessing all the merits of the Murphy button and other mechanical appliances, without the objectionable features of a foreign body.

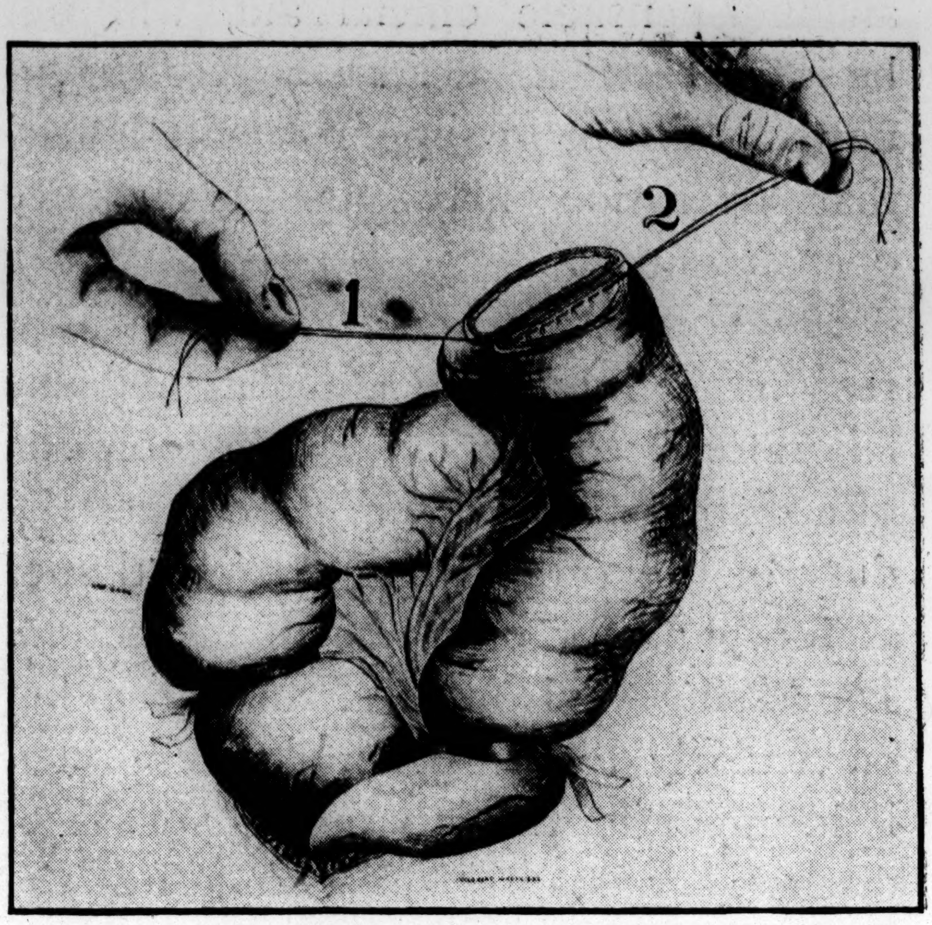

Fig. 2.

The first step in the procedure must be executed with precision. The mesenteric margins must be accurately adjusted, so as to secure perfect approximation (Fig. 1). The needle carrying a medium-sized silk suture, is passed from the lumen through the bowel wall of one cut end, perforating all coats, enters the serosa of the other bowel segment, and passes through all coats of that segment also. The needle is then reversed, and, at a distance of one-eighth of an inch, enters the mucosa of the second cut end, perforates all coats of both segments, and emerges at the mucosa near the point of departure. The ends of the silk are then tied securely. The two bowel segments are then laid side by side, and a stitch similar to the first is inserted on the opposite side of the lumen. Both these stitches are left uncut, and when drawn upon in opposite directions, they bring one-half of the cut surfaces of both segments into apposition, the serous surfaces being in contact (Fig. 2). Between these two points, at regular intervals, similar sutures are inserted, until one-half of the anastomosis is accomplished. Connell states that the same technic may be employed for another fraction of the circumference, but I have not been altogether successful in following his suggestion.

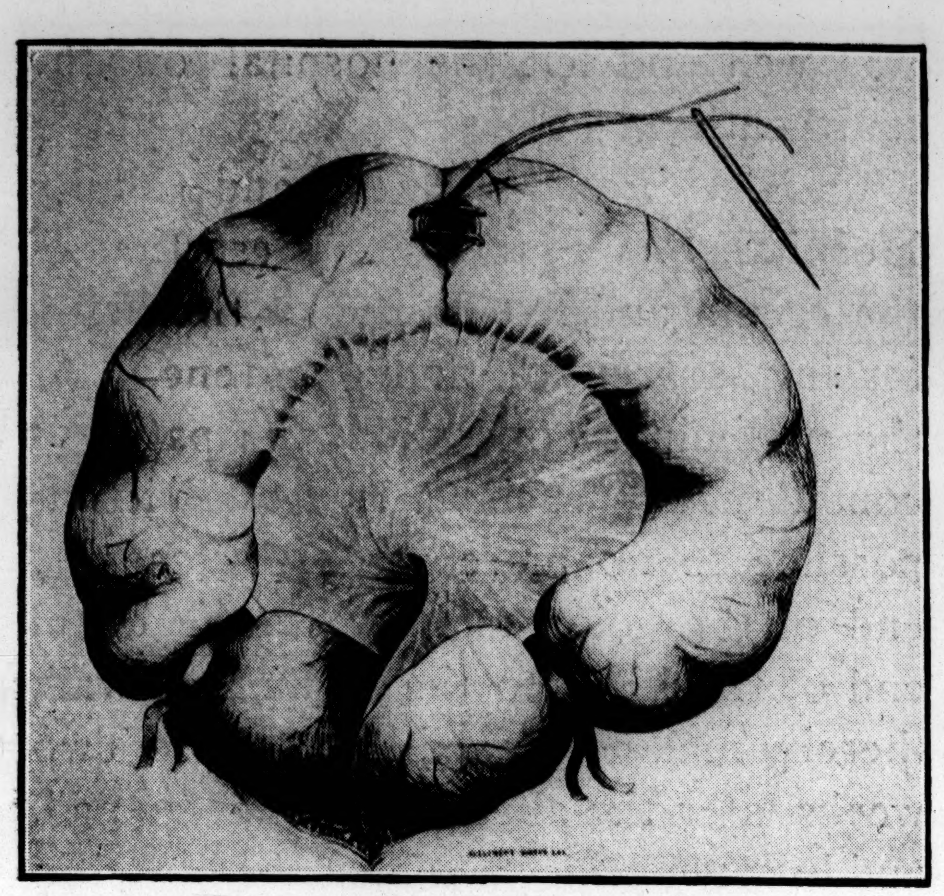

Fig. 3.

The plan I have found available for the second half of the procedure is as follows: Beginning at a proper distance from one of the original stitches, the needle is carried from the lumen through the bowel coat on one side (Fig.3), then it is passed through the serosa, perforating all coats of the opposite side, then reversed and passed from the mucosa to the serosa, then across to the serosa of the first side, and finally emerges in the lumen near the point of departure. The silk is then tied. The cut surfaces, by this procedure, will have been inverted, and the knot, like the preceding ones, will fall within the lumen. In this manner all but one or possibly two of the series are adjusted. The steps essential for the adjustment of the last or the two last stitches are identical with the previous ones until the tying of the knot is in order. This is done as follows (Fig. 4): The free ends of the suture are held by an assistant. The bowel is reversed, and, through an interspace between stitches, needle armed with coarse thread is passed, eye first, and made to emerge at the side of the suture ends. The needle is partially withdrawn, and between its thread and the needle's shank, the ends of the suture are passed by an assistant. The needle and thread are then withdrawn, carrying the suture ends through both coats of the bowel, where they emerge upon the opposite side. The sutures are then tied and the ends cut short (Fig. 5), the knot receding within the lumen of the bowel. When necessary, a final suture upon the same plan may be adjusted, and the anastomosis is completed. Lateral approximation of the bowel is capable of exactly the same treatment as that set forth in the foregoing description. It is claimed by many authorities that lateral is superior to end-to-end anastomosis. It is altogether probable that this position is well taken, where such procedure is possible, but it must be remembered that in extensive resections of the colon,

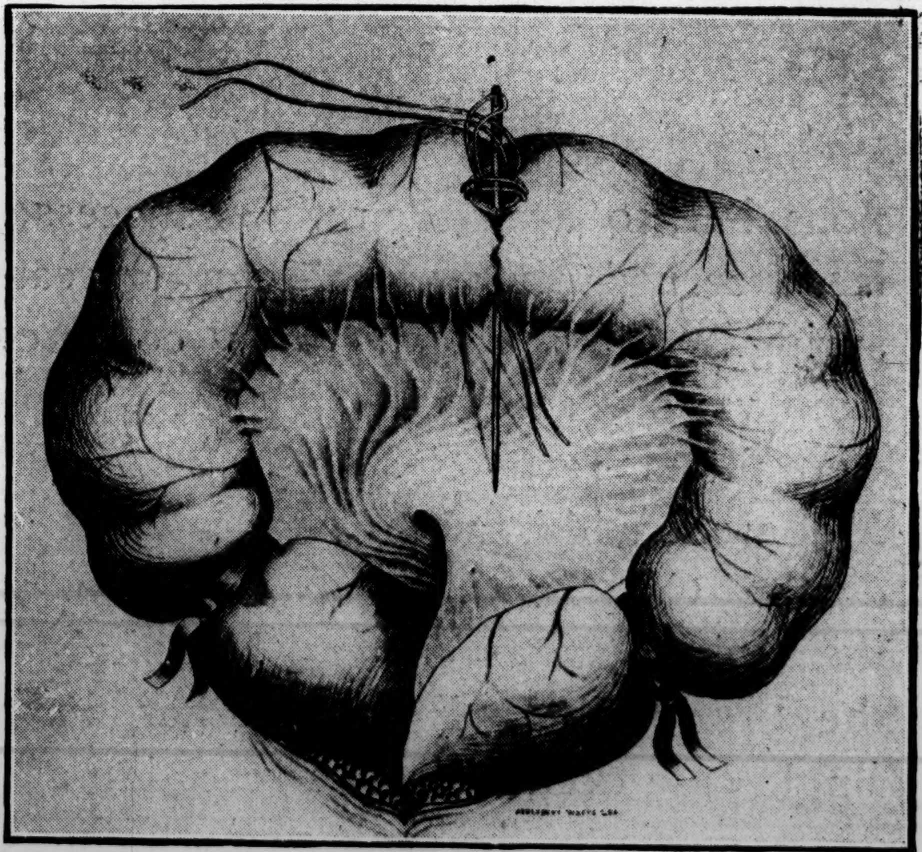

Fig. 4.

particularly at the sigmoid, it will be impossible sufficiently to overlap the resected ends, and an end-to-end approximation becomes imperative.

The description of the operation, unaided by diagrams and illustrations, is difficult of comprehension. I have therefore taken the liberty of copying several illustrations which were used by Connell in his original paper. I have also followed closely his method of description of the various steps.

The statistics of operations done by the Connell method are not voluminous, but, so far as the ratio of successes is concerned, they are altogether reassuring. Of nineteen cases collected from various sources by Connell, there were fifteen recoveries and four deaths. McLaren adds two cases without a death. Col. A. C. Girard, surgeon at the United States General Hospital, at the Presidio, San Francisco, has in a single case done a double resection and anastomosis on the same patient, simultaneously, with success. This case will be alluded to again. I recently assisted Dr. George B. Somers, of San Francisco, in a successful case of resection and anastomosis.

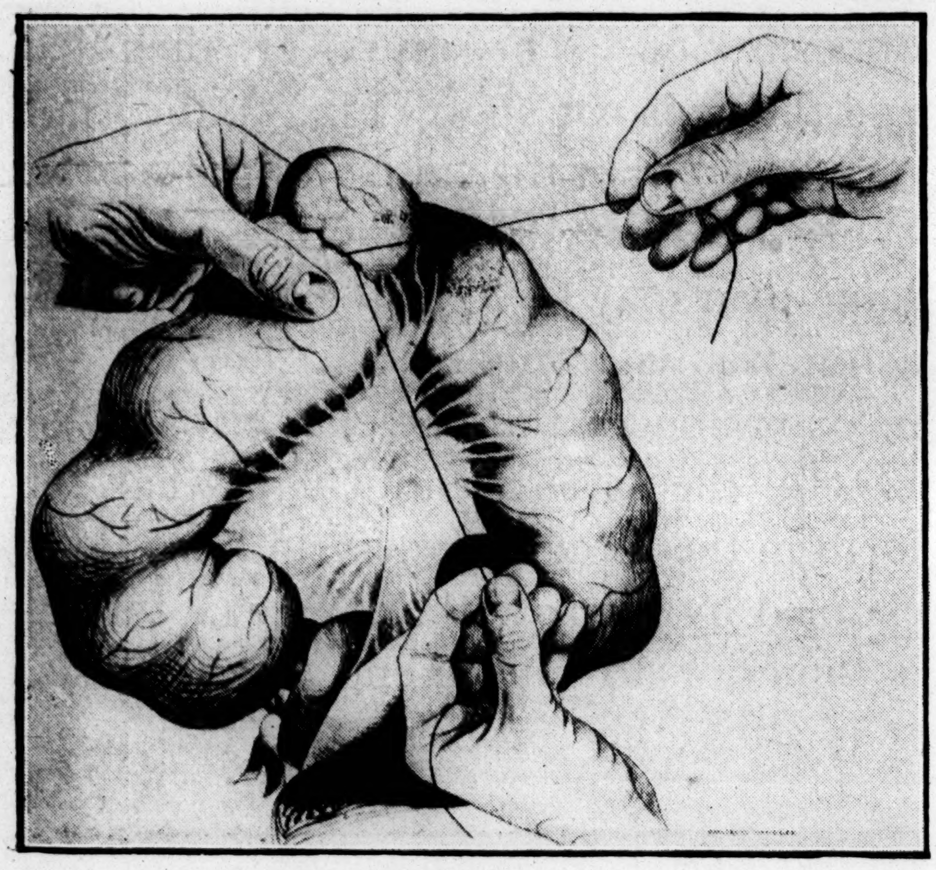

Fig. 5.

I have dealt with six cases, as follows:

Case 1. Mrs. H., aged 35 years. Resection of colon at the sigmoid, for the correction of an artificial anus. Patient was well and left the hospital on the fourteenth day.

Case 2. Patient at City and County Hospital, San Francisco. Resection of the cecum and five inches of the ilium, for intussusception and gangrene. At the preliminary operation, the patient's condition was such as to render it impossible to do more than to close the end of the colon and attach the distal end of the ilium to the abdominal wall, thereby making an artificial anus. Two weeks later the abdomen was reopened, and in attempting to adjust the bowel in its proper relation by an anastomosis, an error in anastomosis was committed, which resulted in the death of the patient on the fifth day. Autopsy showed the suture at time of death to have served its purpose, although a mistaken one.

Case 3. Discharged soldier at Presidio General Hospital was suffering from a large fecal fistula, associated with gall-bladder disease. Through the courtesy of Colonel Girard, I was permitted to do intestinal resection and anastomosis by the Connell suture. Patient made a quick recovery, and was well in three weeks.

Case. 4. Patient at the City and County Hospital, suffering from sarcoma of the right kidney, involving the ascending colon. The kidney was removed and five inches of the ascending colon resected. Anastomosis by Connell suture. Patient lived sixty-two hours, dying from surgical shock. At the autopsy the anastomosis was found to be in perfect condition.

Case 5. The patient is one already reported as having been operated by Colonel Girard, a double resection and anastomosis by the Connell suture. At the end of a week the abdominal wound reopened, and a fecal fistula was reestablished. This was thought to indicate a failure of at least one of the original anastomoses. Five weeks later, at the invitation of Colonel Girard, I made a second attempt to close the fistula. On opening the abdomen, both of the original anastomoses were found to be in perfect condition, but two other independent perforations of the small bowel, due to tubercular ulceration, were discovered. As the only rational course which presented itself, I again made a double resection and anastomosis. The patient was in extremis at the time of operation. He lingered for four days. Upon autopsy, one of my anastomoses was in perfect condition; the other was found to be at fault. This is possibly explained by the extreme attenuation of the bowel wall, due to the original affection.

Case 6. A patient at the City and County Hospital. A male seventy years of age, suffering from a rapidly growing carcinoma of the cecum and ascending colon. The cecum, five inches of the ascending colon, and four inches of the ilium were resected, and an end-to-end anastomosis was made by the Connell method. The patient died at the end of two days. At the autopsy the anastomosis was found to be in perfect condition.

Adding to the nineteen cases of Connell, two cases by McLaren, one by Girard, one by Somers, and five cases by myself, we have a total of twenty-eight cases, with seven deaths. The four deaths reported by Connell show the following state of facts: Three died within a few hours of the operation. One died upon the eighth day. The field of operation was perfect, death being due to a collateral cause. The deaths occuring in my own series were, one from faulty anastomosis, independent of the suture; one from shock, and one from general peritonitis, due to leakage after a double anastomosis five weeks after a former similar operation by another surgeon. In this series of twenty-eight cases, it would seem that all were successful where a recovery could have been expected under any method of treatment.

In closing I can do no better than to quote verbatim, the language of J. B. Murphy, of Chicago, whose opinion as an intestinal surgeon is of great weight. Commenting upon the Connell suture, he says: "It has in it many elements that appeal to the thinker on intestinal approximation. I have found in the use of the suture, that the theoretical advantages claimed for it are sustained in its technical application. It gives an exact approximation of the serosa over the entire circumference of the bowel and particularly at the most important point, the mesenteric attachment. . . .

"If suture is to be used at all, I believe that the Connell suture has advantages over any other with which I am conversant."

A NOTE REGARDING SUPRACONDYLOID FRACTURES OF THE HUMERUS.

By H. M. Sherman, M. D., Professor of Surgery, University of California.

Read before the San Francisco County Medical Society, November, 1902.

The treatment of fractures in the lower end of the humerus was taken out of conventional routine by Allis when he advised that the arm be put up in full extension and abducted to the normal angle of deviation, to prevent the development of gun-stock deformity. Allis believed that the fracture producing the deformity was one of the inner condyle, that is, it broke off the epitrochlea and part of the trochlea. Stimson, in 1900, showed that in this assumption Allis was wrong, and that the fracture which produced gun-stock deformity was a transverse supracondyloid fracture of the humerus. Allis' method of treatment, however, was still a rational one, and is still practiced. Now the fear that the coronoid fossa of the humerus would be filled by fibrous tissue, which would be a mechanical obstacle to flexion, has prevented some surgeons, myself among the number, from keeping the forearm in full extension during the whole of the treatment, and in some instances I have been disappointed at the occurrence of the classical deformity after this half-way treatment. In these cases the forearm had been originally put in full extension, and, as time went on, it had been flexed somewhat, the angle of deviation being most carefully observed. Why should there be gun-stock deformity when this abduction had been maintained? Lately, in caring for a boy who had an open supracondyloid fracture, I was able, with a finger in the wound, to find the answer to this question. It is this: (1) If, in the case of such a fracture, the forearm is extended on the arm to the limit, and abduction is then made, it carries with it the lower fragment, the bones of the forearm and the lower fragment being in the same transverse plane; abduction is then efficient in overcoming this adduction, which constitutes the gun-stock deformity; (2) if, in the case of such a fracture, the forearm be flexed ten, fifteen, or twenty degrees at the elbow, the bones of the forearm and the lower fragment are not in the same plane; abduction of the forearm is accompanied by a rotation outwards of the lower fragment, and not at all by an abduction of it at the point of fracture. The relative positions of the arm and forearm become those of simple flexion at the elbow, and there is nothing to antagonize the tendency to adduction and the development of the gun-stock deformity. This question was studied for me on unfractured arms by Dr. G. J. McChesney. With the forearm fully extended on the arm and the limb lying on a flat surface, the distance from the surface to the epitrochlea was measured. The forearm was then flexed fifteen to twenty degrees, and from that point abduction was made until the forearm came in contact with the arm. Again the distance from the supporting surface to the epitrochlea was measured, and was always found to have increased, showing that the epitrochlea had rotated forwards, that is, that the humerus had rotated outwards. Moreover at the end of this complete motion of abduction the relative positions of the forearm and arm were those of complete flexion of the elbow. Dr. McChesney measured this motion on twenty-two children; the youngest was two and one-half years, the oldest was fifteen years, the average was seven years. The shortest rotation forward of the epitrochlea was 7 mm., in a ten-year-old child; the most was 19 mm., in a seven-year-old child. Mechanically one would expect that in the child having the greatest angle of deviation this rotation would be most marked, but that point has not been studied as yet, though it is of interest. The average amount of rotation in this series was 12 mm. The lesson from this observation and study is that, to control adduction of the limb at the point of fracture and the development of a gun-stock deformity by abduction of the forearm, to reproduce the angle of deviation, the forearm must be fully extended on the arm. In any position short of full extension at the elbow the lower fragment of the humerus (and probably the entire bone as well) rotates to follow the abducting forearm, but does not itself share in the abduction, and there is nothing to prevent the gunstock deformity.

KRAUROSIS OF ANUS.

By George L. Fitch, M. D.

Read before the San Francisco County Medical Society, September, 1902.

Dunglison's definition of kraurosis is: "Atrophy, dryness, shriveling, as of mucous membrane of the vagina." In an article in the "American Journal of the Medical Sciences," November, 1899, by J. M. Baldy, M. D., Professor of Gynecology in the Philadelphia Polyclinic and Gynecologist to the Pennsylvania and Gynecian Hospitals, etc., and H. L. Williams, M. D., instructor in Gynecology in the University of Pennsylvania, Pathologist to the Gynecological Department in the laboratory of the Philadelphia Polyclinic, etc., on "Kraurosis Vulvae," the authors give thirty-four references in the bibliography of the disease, and, as far as the referred to titles in the article show (not having the references at hand to determine positively), no case has been seen affecting the anus only. Baldy and Williams, in describing their case of kraurosis vulvae, say in part: "Four years ago she began to suffer from an obstinate itching about the vulva, which nothing could relieve permanently. Bathing with warm water gave as much temporary relief as anything, although all manner of washes and douches were tried by her physician. At times she suffered from a sensation of drawing and puckering about the vulva, which, however, lasted only a few hours, and then disappeared for a period of months. The patient was referred for treatment for an obstruction at the mouth of the vagina, which had been gradually increasing for some three or four years, and which had made sexual intercourse more and more difficult, until about two years ago, when it was abolished, not on account of any particular harm it caused, but because penetration became a physical impossibility. Repeated attempts at dilation had been made by the physician in attendance, but all had resulted unsatisfactorily. The contraction progressed steadily." An examination of the parts affected disclosed the following condition (the illustration here introduced in the paper being quoted from shows the parts in the same condition as my patient, namely, white in color, and smooth and shrunken): Beginning in the mons veneris half an inch above the clitoris, and extending downward in the form of an elongated oval to just below the anus, the skin and muco-skin of the entire enclosure and perineum presented a dead white appearance, almost as though it had been badly macerated. All trace of the clitoris and the nymphae had disappeared, and the labia majora were almost obliterated as such. No trace of the fourchet was found, and the vaginal opening was barely sufficient to introduce the tip of the little finger, and only then with considerable pain to the patient. At the vaginal opening the disease extended laterally from the mucous membrane for the distance of one-half to three-quarters of an inch. There were no local points of redness and no leucorrheal discharge. At this time the patient had no symptom whatever except the obstruction, and that, of course, was noticeable only when coitus was attempted. The itching and drawing feeling, which at no time had been prominent, had disappeared. There was no obstruction to the flow of urine nor to the passage of the bowels, although the disease extended completely about both the urinary meatus and the anus. Surgical treatment was decided upon, with the object of obtaining a sufficiently patulous condition of the vulva to enable her to resume her marriage relations." The history of the case is as follows: Male; 55; race, Chinese; occupation, keeps a Chinese drug store here on Dupont Street. Denies any hereditary disposition to this disease, and has no venereal trouble, except gonorrhea many years ago, which left no results. Says that about four years ago, after a highly-seasoned dinner at which he drank wine enough to be somewhat influenced thereby, after the dinner he had a burning and itching sensation in and around the anus and rectum, which has annoyed him ever since, being worse at night, but at no time severe enough to incapacitate him for business, but still causing him great annoyance. Inspection shows a ring about half an inch wide entirely around the anus, in which the pigment has nearly disappeared, leaving the parts of a dull white color, with dark spots scattered over the developed area. The skin in the light-colored parts seems thin and shrunken. The rectum is inflamed and the vulva much wasted apparently. The authors of the paper before quoted from, after a thorough study of the disease, are unable to decide on the etiology of it, and no medical treatment so far has proved of any more than temporary benefit. In my case, suppositories of ichthyol and cocain gave him prompt relief, but as soon as the effect of the remedies has worn off the itching returns. External remedies are of no benefit. I believe this to be the first case so far reported of the disease confined to the rectum and anus. I saw a case affecting both vulva and anus some four years ago, the patient being a Chinese girl, aged three years. Treatment in that case did no good, and she soon disappeared, and I do not know the results.

A CASE OF GLANDERS IN THE HUMAN SUBJECT.

By H. A. L. Ryfkogel, M. D.

Read before San Francisco County Medical Society, July, 1902.

The following case of acute glanders occurred in the practice of Drs. Dunn and Herzstein. The patient, Mrs. M., was about 35 years of age, and on Oct. 28, 1901, consulted Dr. Dunn for symptoms resembling those of a severe coryza. Her temperature was 101°. It was subsequently ascertained that a few days previous to her initial symptoms she had been driving a horse and rig, which had been hired from a stable, in which two months before the city veterinarian had slaughtered a couple of horses infected with glanders. It seems probable that this patient was infected from some part of the harness, rugs, etc., that were used at the time of the drive above referred to. After the first visit of Dr. Dunn, the patient's symptoms grew more severe, and typhoid fever was suspected, and, although a diazo reaction was present, no widal could be obtained. Pains now developed in the left knee and right ankle, and somewhat later small, symmetrical abscesses appeared in the neighborhood of the joints on the knee, arms, ankle, and hands, and later on the forehead. When opened, they secreted a thin, watery pus. Dr. Herzstein was called in consultation on October 11, and myself on November 16, and Drs. Regenburger and Thorne on the 20th. The abscesses became more numerous; the nose began to secrete an abundant purulent fluid; the tissues of the face became enormously swollen; pneumonic symptoms developed; the temperature gradually rose to 104°, and the patient died on November 23. The bacteriologic examination consisted in the making of cultures on agar and potato and intraperitoneal inoculations of three guinea-pigs. Microscopic examination of the pus showed a moderate number of small bacilli that showed polar staining and did not stain by Gram's method. They did not look unlike the plague bacillus, and, in fact, examination of the pus led to a suspicion of plague and to my being called in consultation. The cultures on agar showed in forty-eight hours numerous small, whitish, semi-transparent colonies, which had even edges and were brownish by transmitted light. Growth on potato gave the characteristic honey-like appearance of the glanders bacillus. Microscopically the organism in agar culture appeared as a small rod of the same character as that seen in the pus. On the potato somewhat longer forms were present. The organism was non-motile, and only liquefied gelatin after many days. All the guinea-pigs inoculated with pus developed on the third day reddened and swollen scrota, and were chloroformed and autopsied. The tunica vaginalis in each instance was found adherent and covered in places with cheese-like pus. Slides prepared from this material contained the characteristic tubercle bacillus like the micro-organism of glanders, and cultures from them gave a pure culture of the said bacillus, which, when reinjected into guinea-pigs, gave the Straus reaction, and later caused the death of the animals with the well-known lesions of glanders. The blood count made on November 16, when about a dozen of the abscesses had been found, and a week before death, showed 17,000 white cells per c. mm.; of these, 14,025, or 82½ per cent, were neutrophiles, 2,465, or 14½ per cent, were lymphocytes, and 510, or 3 per cent, were large mononuclears; no eosinophiles were found in counting 500 cells.

PLAGUE CASES 85 to 90.

Case 85. Wong Chew Chong, age 54, died October 8, at 753 Clay Street. This case was seen clinically several times October 7. The body is that of a well-developed, fat Chinaman, showing the principal external pest evidence in the right axilla and in the right inguino-femoral region. The glands in both these regions are very much enlarged, show numerous hemorrhages and areas of necrosis, and are embedded in extensive periglandular edema. The axillary glands are in a more extensive stage of degeneration than are the cruro-inguinal glands. The edema immediately around the glands is of a decidedly hemorrhagic nature, while that farthest from them is sero-gelatinous. The iliac and lumbar glands on the right side show the usual extensive involvement, and the arteries passing through this area are free from hemorrhages, while the accompanying veins show numerous small hemorrhages into their adventitiae. The ureter passing through this area shows no hemorrhages on its mucosal surface. There is a chronic nephritis, but the pyramids are injected. The spleen is about normal in size. It is very friable. Its cut surface is moderately rich in blood. The trabeculae are distinct, but the Malpighian corpuscles are not. The heart is enlarged, the cardiac valves are somewhat thickened, and the heart muscle on section shows a light yellow boiled appearance. There are a few subepicardial hemorrhages. The lungs are congested posteriorly. There is no consolidation. The pancreas and the suprarenal capsules are normal. There is no evidence of venereal disease. Microscopy.—Smears from the pest-like glands above referred to and from the spleen show a very large number of organisms like the bacillus pestis. Probable cause of death, bubonic plague.

Case 86. Yee Pang Wo, age 36, died October 11, at 767 Clay Street. This case was seen clinically by me one hour before death, the principal pest evidence being right inguino-femoral buboes and typical plague facies. The body is that of a well-developed, well-nourished Chinaman, showing no evidence of venereal disease nor of any cachexia. The right inguino-femoral glands are enlarged, present areas of necrosis and hemorrhage. The surrounding tissues are infiltrated with a large amount of inflammatory exudate. The lymphatics in this region are not demonstrable. The other subcutaneous glands show some cortical injection, but no surrounding edema. The iliac, lumbar, and hypogastric glands are very much enlarged, hemorrhagic, and necrotic, and are embedded in an extensive post-peritoneal hemorrhagic edema. The veins passing through this inflamed area present adventitial hemorrhages, but the accompanying arteries appear normal. There is an acute nephritis, myocarditis, and splenitis. There is a cloudy swelling of the liver, and the bile passages contain about 100 flat worms of the genus opisthorchis. The bladder and pancreas and ureters seem normal. The gastric mucosa contains several superficial ulcerations, arranged parallel to one another. This condition is apparently caused by the numerous hemorrhages into the folds of the mucosa, for associated with these ulcers are longitudinal areas quite hemorrhagic and seemingly just beginning to undergo ulceration. The lungs are rather edematous, but nowhere consolidated. Microscopy.—Smears from the enlarged cruro-inguinal, iliac, lumbar, and hypogastric glands, and from the spleen, show numerous pest-like organisms. Probable cause of death, bubonic plague.

Case 87. One Yue Nom, age 48, died October 16, at 615 Jackson Street. The body is that of a well-developed, well-nourished, fat Chinaman, weighing about 200 pounds. The principal external pest evidence consists in hemorrhagico-necrotic glands in the right inguinal, iliac, and lumbar regions. The surrounding tissues are very much infiltrated with inflammatory exudate. The glands are soft. The lymphatic vessels are not demonstrable. The veins passing through this pest-like area show numerous adventitial hemorrhages; the accompanying arteries do not. The spleen is about normal in size, but there is an acute pulpitis. The liver shows cloudy swelling and several areas of coagulation necrosis and numerous oriental liver flukes. There is an acute nephritis, and no sign of venereal disease. The bladder and the ureters appear normal, save injected mucosa of the right ureter, which passes through the pest area. There is an acute myocarditis. The lungs are congested posteriorly. There seems to be evidence nowhere of more than one disease. Microscopy.—Smears from the enlarged inguinal and iliac glands, and from the spleen, show numerous pest-like organisms. The doughnut forms predominate in the inguinal glands. These organisms are very clearly demonstrable by staining with freshly-prepared 1 per cent toluidin blue and 2 per cent carbolic acid. This stain seems superior to carbol-thionin.

Case 88. Hoo Hing Bong, age 47, died at 1 P. M., October 16, at 743 Clay Street. The body is that of a well-developed, fairly well-nourished Chinaman, showing the principal external pest evidence in the left femoral region. Section of this area reveals a typical pest-like bubo, 2 cm. in diameter. The iliac and lumbar glands are much larger, surrounded by an extensive hemorrhage, and are themselves more necrotic and hemorrhagic. The spleen is enlarged, the pulp bulges, the cut surface is diffluent. The liver is bile stained, and shows various post-mortem changes, as do the heart and lungs. In the liver there are numerous flat worms of the genus opisthorchis. The kidneys are enlarged, and have undergone advanced post-mortem changes. Microscopy.—Smears from the enlarged left femoral gland and from the spleen show large numbers of bipolar pest-like organisms, along with doughnut forms and several coarse rods, which are probably post-mortal invaders. Probable cause of death, bubonic plague.

Case 89. Arthur W. Caswell, age 33, seen clinically October 28, at the City and County Hospital, the principal pest evidence then being the facies and tongue, the plague bubo having been extirpated from the right femoral region. Necropsy at 10 A. M., November 1. The wound of operation is covered over with a thin layer of purulent fluid, and the tissues themselves are infiltrated with inflammatory exudate. There are around the femoral opening a few small necrotic glands. The iliac and lumbar glands on the right side are enlarged, broken down, and of a dark chocolate color, due to hemorrhage. The surrounding tissues are decidedly edematous and hemorrhagic, the edema extending up to the kidney. The spleen is about normal in size. Its capsule is wrinkled, and the pulp is very soft. The hypogastric glands are necrotic, but not hemorrhagic. There is a chronic nephritis, with apparently an acute exacerbation. The lungs, besides being somewhat edematous posteriorly, appear normal, except the middle lobe of the right lung. Subpleurally over this lobe are several small areas, about 3 mm. in diameter, and of a light yellow color. Situated deeply in the lung tissue is a conical-shaped consolidated area, of a dirty, pinkish-white color, and about 2 cm. across its base. Its cut surface is smooth and grayish pink. About 5 cm. above it is another area which is in every way similar to it, but somewhat smaller. There is no surrounding capsule nor fibrous bands leading off from it. The heart is apparently normal, save for an acute myocarditis; and the pancreas, the ureters, and the suprarenal capsules appear negative. The glands of the axillae and the left inguino-femoral region are somewhat enlarged, and show cortical hemorrhages, but no surrounding edema. There appears to be no involvement of the joints, cutaneous veins, or lymphatics. Microscopy.—Smears from the pest-like iliac and lumbar glands and from the spleen show no organisms. Smears from the consolidated pneumonic area show many organisms having the morphological and tinctorial characteristics of bacillus pestis. Smears from the cruro-inguinal glands that were removed during life showed large numbers of pest-like bacilli and a few diplococci. Stains Used.—2 per cent thionin in 4 per cent carbolic acid, 1 per cent toluidin blue in 3 per cent carbolic acid, Gram's and Claudius' methods. Probable cause of death, bubo-broncho-pneumonic pest.

Case 90. Wong Ngan, age 30. This case was first seen during life at 10

A. M., November 15, the principal pest-like evidence being a large and very tender swelling in the right neck and a smaller one on the left side, together with evident signs of pharyngeal involvement. Examination of the sputum showed very long chains of streptococci and a few bipolar pest-like bacilli. Sputum obtained at 3 P. M., November 15, showed about the same number of streptococci, but a larger number of pest-like organisms. Sputum obtained at 11 A. M., November 16, showed about the same number of streptococci and bipolar bacilli as the sputum taken in the afternoon of the 15th. The swelling in the right neck was very much larger. The man died at 8 P. M., November 16. Necropsy began at 11 A. M., November 17. The body is that of a well-developed, fairly well-nourished Chinaman, showing the principal pest evidence in the right neck. Section of this region reveals numerous hemorrhagico-necrotic glands. The glands for the most part are almost entirely broken down, and the surrounding tissues are infiltrated with inflammatory exudate. A similar condition, but to a less degree, prevails on the left side of the neck. On the left postero-lateral neck is a small-sized boil. The tonsils are somewhat enlarged, necrotic, and embedded in an extensive edema. At the base of the tongue on the right side is a very much enlarged gland, about 2 cm. in diameter. It is quite swollen, and shows evidence of active inflammation. The heart is about normal in size. The left ventricle is firmly contracted; the right ventricle and auricle are dilated, the ventricular wall thin and flabby. The cut surface of the heart presents a boiled light-yellowish appearance. The mitral valve is somewhat thickened, though the orifice does not appear to be dilated. The endocardium and the other cardiac valves seem unaffected. Posteriorly there are several small subepicardial hemorrhages. The pericardium seems normal, as do the large vessels of the thorax. The left lung is free in its cavity, and shows several consolidated areas, measuring from 1 cm. to 2 cm. in diameter. Most of these are on the surface of the lung, the overlying pleura having lost its luster. Section of these areas shows a uniformly pinkish-white color, with no surrounding capsule or fibrous bands. The consistency of the consolidated areas is the same peripherally and centrally. The general shape of these areas is conical. There are, in addition, three or four darker circumscribed subpleural areas, nearly approaching consolidation, and giving every appearance of being the first stage of the process. The right lung is attached to the thoracic wall at the middle lobe by old pleural adhesions, opposite to which are evident caseous tubercles. In the lower lobe of this lung there are consolidated areas similar to those described in the left lung, and some of them are deeply situated. The pulmonary consolidations appear to be distinctly of two kinds, namely, tubercular and broncho-pneumonic. The spleen is very much enlarged and friable. Upon the capsule are fresh deposits of lymph. The capsule is tense, and there are a few reddened subcapsular nodules. The cut surface of the spleen is rich in blood. The Malpighian corpuscles are distinctly enlarged. The trabeculae are somewhat obscured. No infarcts are apparent. The pancreas is somewhat reddened, but otherwise apparently normal. The kidneys are enlarged; the capsules strip off readily without bringing away cortical substance. The cortices are swollen, and the labyrinths appear engorged, the pyramids reddened. The pelvis and the ureters seem normal. The suprarenal capsules do not appear enlarged, but are broken down. The bladder contains about 5 c. c. of urine. The mesenteric glands are somewhat reddened, but not enlarged. The intestines seem unaffected. The liver is about normal in size, and presents no areas of coagulation necrosis or circumscribed abscesses, but section of it is firm. The gall-bladder and the ducts seem normal. The iliac and hypogastric glands are not enlarged, but the lumbar glands are about three times their normal size, and one of them is dark in color, but there is no surrounding edema. The axillary glands are enlarged, and present deep cortical injection, but the surrounding tissues are not edematous. The inguino-femoral and other subcutaneous lymph glands appear normal. Microscopy.—Smears from the enlarged cervical glands show streptococci and bipolar pest-like bacilli. The streptococci predominate. Smears from the spleen show a few diplococci, but no bacilli. Smears from the broncho-pneumonic areas show numerous bacilli, which are tinctorially and morphologically pest-like, and a very few streptococci, the pest-like bacilli being in the great majority. Probable cause of death, bubo-pneumonic plague.

Occidental Medical Times

Communications are invited from all parts of the world. When necessary to elucidate the text, illustrations will be furnished without cost to the author. Published monthly.

OFFICE OF PUBLICATION, : : : 1121 SUTTER STREET, SAN FRANCISCO.

THE STATE BOARD OF MEDICAL EXAMINERS AND ITS CRITICS.

The California Board of State Medical Examiners during the last few months has been severely censured by various medical journals for certain questions presented to the applicants at the August examination.

The charges, with one exception, have been confined to a class of journals that seem ever ready to oppose the progress and welfare of the profession, either state or national, unless their own interests are specifically served. Their motives are never broad, loyal, or patriotic; their policy has always been selfish, and has always aimed to further causes of questionable benefit to the world at large.

The discussion originated with a local faction, which has antagonized the law from its very inception, fought it in the state society, in the committee where it was framed, and in the state legislature. The attack was made to discredit the honesty of the examiners, to depreciate the value of the law, and to bring about a wide-open condition of affairs, whereby anybody and everybody, the graduates of any and every school, will be able to prey upon the public. Their object seems to be to uphold medical education, not that men may become proficient and full of knowledge, but that a certain class of schools may continue to enrich the pockets of a few individuals.

The specific charges were unfairness and trickery in the use of the terms "cryoscopy" and "Hanot's cirrhosis," and favoritism to certain schools. It is readily admitted that the use of personal names and words not in common parlance under these circumstances is reprehensible and leaves room for criticism, but it is also true that if the remaining questions of this section had been satisfactorily answered, the percentage of 60, which is considered sufficient to pass a candidate, could have easily been secured. The truth of the matter is that all who failed deserved to fall. In proof of this two sets of credits have been selected from the examinations, one giving the percentages in the first examination, December, 1901; the second, a portion taken indiscriminately to include one-half of the failures in the examination of August, 1902. A careful scrutiny of these records will reveal only too plainly the cause of failure of these candidates. Against record No. 1 no charges of unfairness, no attempt at trickery or use of catch questions, and no efforts to favor one school over another, have ever been preferred. The examinations were considered fair. No candidate came up from the College of

DECEMBER, 1901.

Anatomy.	Physiology.	Pathology.	Chemistry, Toxicology.	Materia Medica and Therapeutics	Bacteriology.	Obstetrics.	Theory and Practice of Medicine.	Surgery	
91	98	73	61	84	90	84	79	92	
65	71	44	60	75	70	69	62	43	Failed.
81	96	67	84	78	90	96	75	72	
72	100	67	81	81	98	79	77	72	
60	83	82	82	95	95	92	83	61	
50	63½	35	45	80	58	50	43	41	Failed.
86	89	75	56	81	93	84	71	78	
70	87	90	54	81	93	95	93	86	
45	84	57	41	76	86	67	62	64	Failed.
61	95½	93	75	84	85	94	87	77	

Physicians and Surgeons of San Francisco, and yet the credits in pathology of those who failed are strikingly similar to those of the August record. It is an undeniable fact that a man properly accredited to practice medicine should know the essentials, the fundamental branches, well; he should be well up in anatomy, the principles and practice of physic, materia medica, surgery, etc., but a glance at the records will convince the most skeptical of a most lamentable deficiency, not only in pathology, but in every study. If a candidate can only secure 50 in anatomy, 60 in surgery, 60 in theory and practice, and similar or poorer equivalents in other branches equally important, surely no sane man or journal would question the action of the board. Not only is this insufficiency shown in table No. 1, but a parallel want of knowledge in pathology and all branches is hopelessly recognized in No. 2. The incontrovertible facts exemplified in these records are the strongest and most eloquent arguments that could be offered in favor of the necessity of the law. Such a showing is ample to prove that certain schools here and in other states are far below the standard required by the Association of American Medical Colleges in either efficiency in teaching facilities or the quality of their pupils. It completely exonerates the board of the charge of favoritism or unfairness, which is further substantiated by the uniform percentages of those who passed, as by the miserable showing of those who failed. A further proof that the charges urged against the board are groundless and malicious is certified to by the record of the graduates of schools here and elsewhere that are recognized by the whole profession as being sufficiently equipped

AUGUST, 1902.

Anatomy.	Physiology.	Bacteriology.	Pathology.	Chemistry and Toxicology.	Surgery.	Obstetrics.	Materia Medica and Therapeutics	Theory and Practice of Medicine.	
52	79	81	24	53	60	76	64	65	Failed.
68	97	89	60	66	90	87	80	88	
70	91	98	60	90	80	92	78	78	
52	85	94	39	83	55	83	49	60	Failed.
66	91	88	60	80	84	90	77	89	
27	50	54	28	30	59	48	72	50	Failed.
90	91	79	75	71	92	82	86	86	
66	94	89	67	67	78	94	80	86	
66	87	81	61	60	89	81	83	80	
75	81	84	61	62	91	83	81	78	
90	94	95	84	80	86	89	92	91	
78	92	90	76	71	84	87	74	84	
65	82	86	65	52	81	80	92	75	
36	62	75	55	61	56	71	79	75	Failed.
60	85	75	60	54	60	68	78	60	Failed.
77	88	92	82	80	85	96	79	83	
95	94	94	83	83	83	96	88	80	
87	93	87	82	68	89	80	78	86	
32	68	63	31	09	38	65	64	40	Failed.
46	91	86	46	70	58	61	79	58	Failed.
65	88	98	60	84	70	86	90	77	
60	87	86	60	73	61	94	85	72	
51	83	81	43	16	61	94	80	65	Failed.

	Passed.	Failed.	Conditioned or withdrew.
Med. Dept. Univ. California	26	1	....
Cooper Med. Coll.	16	1	5
Coll. Phys. and Surg., S. F., Cal	5	8	....
Coll. Med. Univ. Southern Cal	10	....	....
Univ. of N. Y., Bell. Hosp. Med. Coll.	2	3	4
Med. Dept. Univer. Mich	3	2	1
Johns Hopkins, Md	6	....	2
California Med. Coll., S. F. (Eclec.)	....	5	....
Med. Dept. Northwestern Univ	3	1	....
Hahneman Med. Coll., Ill	1	1	2
Hahneman Med. Col., Pa	2	1	....
Coll. Phys. and Surg., Ill	2	1	....
St. Louis Med. Coll., Mo	....	1	2
Med. Coll. of Mo	....	1	2
Med. Univ. of Louisville	....	1	2

In the following schools all passed: Jefferson Med. Coll., 2; Univ. Vienna, Austria, 1; Eclectic Med. Institute, Ohio, 1; Columbia Coll., N. Y., 1; Univ. London, Eng., 1; Coll. Phys. and Surg., N. Y., 2; Med. Coll. Kiel, Ger., 1; Coll. Med., Syracuse, N. Y., 1; Harvard, 3.

In the following, all failed or withdrew: Certif. State Board of Vermont, 1; Ensworth Med. Col., 1; Coll. Phys. and Surg., Ohio, 1; Royal Med. Coll., Naples, Italy, 1; Med. Dept. Univ. Vermont, 1; Louisville Med. Coll., 1; Med. Dept. Univ. Buffalo, 1; Coll. Phys. and Surg., Mo., 1; Columbus Med. Coll., Ohio, 1; Coll. Phys. and Surg., Keokuk, Iowa, 1; Illinois Med. Coll., 1; Med. Dept. Univ. Baltimore, Md., 1; Kansas City Med. Coll., 2; Kentucky School of Med., 2; Med. Dept. Tulane Univ., 1; Univ. Med. Coll., K. C., Mo., 1; Med. Dept. Univ. Md., 1; Memphis Hosp. Med. Coll., 1; Saginaw Med. Col., Mich., 2; Gross Med. Coll., 1; Barnes Med. Coll., Mo., 2.

In the following, one passed and one failed: Med. School of Maine; Chicago Homeopathic Med. Coll.; Med. Dept. Univ. Iowa; Rush Med. Coll.

THE HAHNEMANN HOSPITAL COLLEGE

to so educate their students that they will be able to properly care for the sick and to meet the demands of modern medicine. The records presented do not vary from those of students examined by other boards, and maintain in a universal way the necessity of such boards and the fact of the incompleteness and imperfections of certain schools.

It is therefore very evident that these criticisms were prompted, not in a spirit of truth, justness, or honor, but to bring about a disparagement of the law, reproach upon the examiners, that certain ends might be attained that in no way redound to the welfare of the profession.

THE PLAGUE STILL A BURNING QUESTION.

At the present time Eastern medical journals and boards of health and the local newspapers are fighting more vigorously than ever over this much-discussed question, one affirming as vigorously as the other denies the facts. It is unnecessary for the TIMES to consider the matter further; for two years it has upheld the truth of the situation on every point; and had these very same journals and boards of health acted long ago they possibly would have saved the country from infection, and probably some lives. Hitherto references of a half-hearted fashion have been made to the situation by some of these journals, while others, now clamoring for protection and aid, have belittled or almost denied the truth; but be that as it may, their concerted action even now is commendable. What the TIMES has urged and insisted upon is gradually coming to pass, and soon the whole state must acknowledge the facts, and with no honor to itself. In the issue of *American Medicine* of November 8, a condensed review of the situation is given as a preamble to certain resolutions passed by the provincial boards of health, wherein an error occurs, which, in the face of the charges made against the local profession, needs correction. It reads thus: "From this time (October 30) scanty information is obtainable, no published communications between the United States Marine Hospital Service being available, and those who conspired to suppress the facts being in complete command of the situation." This statement is partly contradicted a few lines below, but the one point we wish to insist upon is that those who have denied the facts have never been in supreme control, and, further, if the author of these resolutions will review the pages of the Sacramento *Evening Bee* and the TIMES, he will find a most complete record to date of all cases, their autopsies, and editorials, giving the facts in the whole affair, which show up in no uncertain terms the villianous conduct of the California authorities. Plenty of evidence is on hand in the various government offices in Washington, and surely the *Bee* and TIMES have not failed in their duty to keep the world posted.

* * *

On November 24 a series of resolutions were signed by the secretaries of five boards of health of different states, in compliance with the law, demanding that the Surgeon-General of the Marine Hospital and Public Health Service convene as early as possible the boards of healths of the United States, for the purpose of devising means of suppressing the plague in California. It is hardly possible for the governor of this state and his satellites, the State Board of Health, to mistake the meaning and import of these resolutions. A quarantine at this time would be a serious blow; but unless the authorities and financial interests interpret promptly these proceedings and yield by word and action, there will be more trouble ahead than their false and selfish policy ever led them to dream of. Now is the time for action; deception and lying have reached their limit.

It is worthy of serious notice that the last four cases have all died of the pneumonic form of the disease. .

The following is the record for November:—

90. Wong Ngan, age 30, male, died November 15, at 37½ Brenham Place.
91. Wong Hoi, age 36, male, died November 18, at 7 Brenham Place.
92. Leong Sen, age 50, male, died November 26, at 834½ Washington Street.

THE GOVERNOR-ELECT, GEORGE C. PARDEE, AND THE DUTY BEFORE HIM.

The election of Dr. Pardee no doubt meets the approval of the profession of the state. He is raised thereby to the highest gift in the possession of this commonwealth, and his duties and responsibilities are proportionately increased. His past record is worthy of the man and his honesty; his new obligations will test him severely. He can not sacrifice his personal or professional honor to the dictation and greed of politics. It is not our purpose to dictate to him, but prefer to offer the opinions of others, which portray fully the severest task that has ever confronted one in the same position. They read thus:—

> When Dr. Pardee shall be inducted into office, he will find himself confronted with the duty of putting a stop to the policy of falsification and attempted concealment that has disgraced the administration of Governor Gage. Without the governor-elect's cooperation and connivance that policy can not continue. It will be Dr. Pardee's duty to reverse the course pursued by the State Board of Health, abandoning lying and vilification, and taking prompt and vigorous measures to stamp out plague in San Francisco. That is the only way to get rid of the trouble, and at the same time to inspire confidence in other states and abroad that California is capable of grappling with this dangerous problem, as well as honest and intelligent enough to tell the truth about it. This new departure would involve a stultification of Governor Gage, but his successor is in no way responsible for the sins or blunders of the present administration. The way Dr. Pardee shall treat this plague matter will give the public a pretty good insight into the sort of administration that may be expected from him during the next four years.—Sacramento Bee, Nov. 11, 1902.

> The election of Dr. Pardee as governor may be, and we hope will be, an earnest that the disgraceful regime in California that has concealed and denied the truth, will soon be at an end. Dr. Pardee is face to face with a grave responsibility, and his character as a man and as a physician is about to be put to the test.

> We believe it to be fortunate, indeed, for the country at this crisis that a physician is to occupy the gubernatorial chair in California. The opportunity is great, and we trust the man is at hand. It will be an honor to the medical profession, no less than a crowning service to the country at large, to have this abominable situation changed by the conscientious and fearless action of a medical man. Unfortunately too many medical men in California have sinned against the light. Dr. Pardee can do much, not only to redeem his state, but also to reconstruct some members of his profession.

> The action of the authorities and the people, as well as of some physicians, in California will remain for all time as an example both of short-sighted policy and of dereliction from public duty. The country has been treated to a series of denials, scoffs, and jeers at the expense of the properly-accredited scientists who demonstrated beyond peradventure that bubonic plague existed in San Francisco. The denunciations of politicians and newspapers have been the answer to the demonstrations of science. Was ever such a spectacle presented before in a civilized state?

> It seems now that California must face her own humiliation. The situation from being a public peril has become a public nuisance. San Francisco may have to face a quarantine, as well as the opprobrium of this situation. If it is necessary to save the whole country, the general government should act.

> We are well informed that most of the best men in the medical profession in California have had no sympathy with the policy of denial. It has been a popular and political

madness, and one which unfortunately has swept some weak-kneed individuals off their feet.—Philadelphia Medical Journal.

The Resolutions are as follows:—

"And, Whereas, Thirty of these cases have occurred since July 13, 1902, no information as to their origin or exact location having been furnished, no effective steps having been taken to restrict the spread of the disease, the City Board of Health of San Francisco being helpless, and the mala fides of the State Board of Health of California having been fully established by the foregoing history, supported by documentary evidence in the possession of this conference; therefore,

"Be it Resolved, That the Conference of State and Provincial Boards of Health of North America views with abhorrence the irretrievable disgrace of the State Board of Health of California, and pronounces the plague situation in California a matter of grave national concern; and,

"Be it further Resolved, That the National Conference of State and Provincial Boards of Health of North America does hereby advise the various state boards of health of the United States to consider the propriety of calling upon the Surgeon-General of the United States Public Health and Marine Hospital Service to arrange at the earliest possible date a joint conference for the purpose of eradicating plague from the United States."

THE YEAR'S WORK.

The closing of volume 16 is done with a feeling that the year's work has not been without its measure of reward. If this statement can be made with any justness to the record of the TIMES, it applies with much greater truth to the work of our societies and certain individuals. Not only have the societies been stimulated and spurred on by amalgamation with the American Medical Association, but a greater degree of interest has been manifest on all sides. The County Society has greatly increased in membership, and their program has been of a very high order. The attendance has been the largest in its history, and what is said of the County Society is true of the others. The Academy's meetings have been exceedingly well attended, and their program interesting and important. The same spirit that has been so prominent in the splendid work of these societies has seemingly inspired certain men to greater and renewed effort. The year has been so prolific of good work, that, believing with Sydenham when he says, "I have always thought (and not without reason) that to have published for the benefit of afflicted mortals any certain method of subduing even the slightest disease was a matter of greater felicity than the riches of a Tantalus or a Croesus; I have called it a matter of greater felicity; I now call it a matter of greater goodness and of greater wisdom,"—we have dared to mention the names of the authors of certain papers with a degree of pride and with due deference to others, that a like inspiration will inflame them with ambition for the future. Prominent among those who have added to our knowledge are Rixford, Levison, Spencer, Hunkin, Watkins, Vowinckel, Huntington, Goodfellow, Sherman, Briggs, Morton, Sanderson, Powers, and Johnson. Their contributions were either of a high degree of general excellence, or contained some new proposal for the benefit of mankind. Of all the contributions, that on "Perineal Prostatectomy," by George Goodfellow, besides being a new operation, bids fair to confer the greatest boon on humanity.

Besides the exemplary work of certain individuals, this year has given birth to a new journal, the "California State Journal of Medicine," edited by the Chairman, with the assistance of the members of the Committee on Publication. Previously the papers and transactions have been published in book form; but, in order that the new order of things would be complete and the spirit of the times lived up to, the executive committee determined to bring out the proceedings in a more modern form. The first volume is just to hand. It is made on the plan of many of the higher-class weeklies. Its appearance is neat and creditable. Much of the material is a trifle old, but it was essentially a part of the society's work, and must appear in its organ. The new material, as well as the aims and objects of the journal and the policy of the editor, is well presented. There should be no doubt of its success; it should receive the goodwill of the profession; and, if the initial number be any indication of its future, its reason for existence should be well approved.

CYTODIAGNOSIS.

In this issue there is published a paper on "Cytodiagnosis," by Eleanor Fairman Preston, M. D., which deserves more than passing notice, not only because of its excellence as a review of Ravaut's treatise, but because of the important finding for the first time in medical history of the colon bacillus in the fluid of the spinal canal. This excellent article should stimulate all those connected with hospitals to take advantage during their internship of the chances for study, rarely secured after entering practice. Dr. Preston's work is extremely creditable, both from a literary and scientific standpoint, and deserves careful perusal by all practitioners.

FOURTEENTH INTERNATIONAL MEDICAL CONGRESS.

The American Committee of the Fourteenth International Congress of Medicine announces that blank forms of application addressed to the Bureau des Logements, in Madrid, forms of application for those who desire to read papers at the congress, as well as other literature bearing on the subject, may be obtained upon request from the secretary of the committee. (Signed)

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Chairman.

THE WORK OF PROFESSOR LORENZ IN SAN FRANCISCO.

The operations performed by Prof. Adolf Lorenz, of the Imperial and Royal University, of Vienna, during his recent visit to this city, comprised the following: His first operation was on Tuesday, November 4, at the Children's Hospital, the case being a mechanical or bloodless reduction of a bilateral dislocation at the hip-joint, occurring in a little boy of three years. The acetabulum was deeper on the right side than on the left, and the reposition on that side was correspondingly more stable. The reduction of the dislocation having been accomplished, a plaster-of-Paris dressing was applied, to hold the thighs abducted at a right angle and overextended. Six months later this dressing will be renewed. The second dressing will remain in place five months. Thereafter the child will be permitted to go without a retentive dressing, and abduction and flexion exercises will be prescribed, together with massage. The massage will be directed principally to the pelvitrochanteric group of muscles. Professor Lorenz also performed an anterior transposition of a congenitally-displaced hip in a girl of nine years. She had passed the age when the true reposition is likely to be accomplished. The femoral head now rests below and externally to the anterior superior iliac spine. On Wednesday, November 5, Professor Lorenz performed his typical operation on one unilateral and one bilateral case of congenital dislocation, before the faculty and students of the Medical School of the University of California. On the same occasion he performed his remodeling operation on the congenital clubfeet of a baby. On Thursday, November 6, Professor Lorenz reduced one unilateral and one bilateral case of congenital dislocation of the hip-joint, before the faculty and students of the Cooper Medical College. He also operated upon a case of relapsed bilateral clubfoot, occurring in a girl of twelve years. On Friday, November 7, at the German Hospital, Professor Lorenz operated, by multiple tenotomies and manual redression, a case of rheumatoid arthritis, occurring in a boy seventeen years old, the case presenting also some spastic symptoms. A young girl, presenting the typical adduction-flexion contracture of an old coxitis, was also operated. The soft part beneath the iliac spine and the adductors were tenotomized, and then the deformity was gradually corrected with the hands. Finally the patient was placed in Professor Lorenz' "hip redresseur," and the limb fixed in abduction and extension during the application of a plaster-of-Paris spica. The spica did not extend beyond the knee. After some months this spica will be removed. Thereafter the tendency to flexion will be combatted by placing a cushion beneath the patient's knee as she lies face downward on the table, and weighting her buttocks with sand-bags to the amount of fifty or more pounds. This will be done for fifteen minutes, twice daily. The tendency to a recurrence of the adduction will be combatted by teaching the patient to sink the affected side of the pelvis while standing on a stool. On Saturday, November 8, at the Children's Hospital, Professor Lorenz reduced one double congenital dislocation, corrected a flexion-adduction contracture, following coxitis, in a girl of twelve years, and another appearing in a young woman of twenty-five. His last operation was to correct manually a flexion abduction deformity of the fingers, with subluxations at the first interphalangeal joints, the whole being secondary to multiple osteoarthritis, the hypertrophic type. Subsequent treatment will consist of massage and active and passive motion of the fingers while they are maintained in the corrected position. On Sunday morning Professor Lorenz left for Los Angeles. J. T. Watkins.

[The March issue of this journal contained a paper by Dr. Watkins, entiled "The Klink Lorenz." It gave an account of the methods of treatment employed by the Vienna surgeon. This record of the work of Professor Lorenz was kindly furnished by Dr. Watkins, at our solicitation.—Editor.]

SAN FRANCISCO MEDICAL SOCIETY.

Regular Meeting, September, 1902.

The president, Dr. J. C. Spencer, in the chair.

ON FLATFOOT; ITS MECHANICS AND TREATMENT.

Dr. J. T. Watkins read a paper with above title. [Published at page 479.]

Dr. W. I. Terry: The paper just read by Dr. Watkins shows that he has put a great deal of work on its preparation, and he certainly deserves much credit. He seems to lay great stress on the shape of the shoe, but I did not hear any mention made all through of the proper shape of the stocking, which I believe to be an important detail. The toe-post was also not mentioned. I consider it of great importance in the adaptation of an abnormal foot to a properly-shaped shoe.

Dr. S. J. Hunkin: With regard to what Dr. Winterberg says, "the reason we do not find statuary showing the pronated foot was because artists are not likely to pick out people with deformities for reproduction. Out in our hospital ward there hangs a copy of a beautiful painting; I do not know the name of it; it looks like an angel running away with a girl. The angel has, however, a decidedly pronated foot, with a marked tendency to hallux valgus; so that artists do sometimes choose people who have defects for models. I am surprised that Dr. Watkins did not mention rachitis as a cause in flatfoot. I have hardly ever seen a case that did not show this tendency to have loose joints everywhere, the foot simply giving way in this manner because it carries all the weight. In the case of the girl seen to-day, the knee-joints will overextend 10 to 20 degrees, and the elbow will extend 10 degrees. This shows all the elements of rachitis.

Dr. J. C. Stinson: I have listened to the paper with interest. It appears to me in adults with flatfeet that forcible rectification of the arch is quite trying and tiring on the operator, and, furthermore, unless one is quite strong, one can not usually spend enough force to completely overcome and cure the deformity; personally I prefer to use additionally some instrumental force, i. e., Thomas' wrench, or some other somewhat similar instrument. In every case the operation usually has to be repeated once or twice, if the bones are not in a normal position. Once in a while repeated manual or instrumental wrenching is not successful, and a cutting, and may be a long operation, has to be performed, to complete the cure. Dr. Hunkin's paper is quite interesting; the case reported is encouraging. I should be pleased to hear further reports of such operative cases before this society. Dr. Frisbie does not mention in his paper about bone operations. It appears to me that in some cases bone operations have to be done to complete cures of clubfeet. Suppose a foot can not be supra-correct after doing Phillips' operation and forcible correction; something further must be done. In these some bone operation has to be done, and the bone operation that should be done depends upon which bone or bones are deformed, i. e., chiseling section or excision (partial or complete) of one or more bones of the foot and ankle. Such bone operations should be reserved for intractable, uncured, and relapsed cases.

Dr. T. J. Watkins: With regard to proper shoes: I think the one I have described, the Sampson shoe, is most nearly ideal. I had hoped to have the last for such a shoe to show to-night, but was disappointed by my shoemaker. I did not advocate the toe-post, because I have had no experience in its use, and because it had not given satisfaction to those of my colleagues who have experimented with it. In a letter I received three days ago from Dr. Sampson he said nothing about an ankle strap. I have never used it. On theoretical ground I am disposed to advocate the use of the plate I have described rather than that of Dr. Sampson. The latter would appear to fix the foot in the adducted position, but to admit of very little motion in the foot itself. The other plate interferes very little, if at all, with the normal size of the foot, and exerts thrusts on the bones which simulates the physiological pulls of the muscles. Replying to Dr Winterberg: I can not accept his suggestion that the ancients chose models with perfect feet. For example, the statue of the "fighting gladiator," one of the finest masterpieces of antiquity, presents distinctly pronated feet. Modern art has fared no better; if the doctor will go to the "Bohemian Club" he will find a much-admired statue of a young female, with a most abominable pair of out-going toes. In the matter of bedclothes, I have under my care now a patient who has been confined to his bed for three years with contracture following multiple rheumatoid arthritis. I expect to get him up shortly, but am having most of my trouble with his feet, though they were not originally affected. He went to bed with a good pair of feet, but they have been forced by the weight of the bedclothes into such abduction and extension that I fear I shall have to cut the tendo Achillis to get them up into position. In the matter of stockings I can only detail my own experience. The other night when I was finishing this paper it occurred to me to outline my own foot on paper. I did so, and then after putting on a tight new stocking made a second tracing. It showed a distinct deviation outward of the great toe.

Dr. Hunkin: Dr. Frisbie seems to find the treatment of congenital clubfoot much easier than I do, but, of course, we can not discuss this point, as the doctor is not here.

CALIFORNIA ACADEMY OF MEDICINE.

Regular Meeting, October 1902.

The president, Dr. D. W. Montgomery, in the chair.

SARCOMA, WITH HERNIA CEREBRI.

Dr. L. Newmark: The young man came to the city in June, 1901. He had been suffering from severe headaches, which finally prostrated him. The first headache had occurred four years before; it was attended with hemianopsia. Then there were no headaches for two years. When they recurred, at the end of that time, they seem to have come and gone at first like ordinary habitual headaches; a night's rest would often make them disappear. But the paroxysms became more frequent, and, finally, as the patient's mother said, "It was one hypodermic of morphin after another." A sudden feeling of numbness in the left upper extremity, sometimes affecting the left side of the face, which had occurred a few times, was the only other incident reported in the boy's history. For ten days after his arrival in San Francisco, the patient was quite free from discomfort, and he presented, at the first glance, a perfectly healthy appearance. Examination, however, revealed a paresis of the left lower facial, and bilateral choked disc. In the course of time a tenderness to deep pressure, not to percussion, was discovered on the right side of the skull, at a spot corresponding about to the area of representation of the movements of the face. His vision at this time was slightly affected. In August, 1901, the skull was opened at a site just anterior to the motor area of the left facial, and when the very tense dura was incised, a mass which looked like flattened convolutions came into sight, and was removed. The microscope showed that it contained a round-cell sarcoma. After the operation the patient was relieved of his pain, but his vision declined rapidly, and the ophthalmoscope soon showed that the swollen discs were subsiding into atrophy. He went home feeling comfortable, but returned last April, again complaining of pains in his head. He was, therefore, again operated upon. After this operation, a paresis of the left hand and slight hyperesthesia of the left upper extremity ensued, and he has them still, although in a minor degree. His vision seems to have improved a little. Occasionally he has pain of moderate severity. The patient is nineteen years old.

Dr. H. M. Sherman: There was not much for him to add. The first operation, as Dr. Newmark had said, exposed the brain, and it bulged into the opening, but enough was removed to relieve the tension. It was not possible to distinguish macroscopically between the healthy brain and the presumable tumor. The amount that was taken out was perhaps 30 or 40 c. c. This is guessing at it, because some was wiped off and some removed with knife, and it is difficult to say exactly how much there was. It was not possible to collect and measure it. There was a cutaneo-osseous flap, and the whole thing was replaced, and the healing was uneventful. At the second operation not only what would come out of the opening was removed, but a good deal more. He used a curette, and took out all that he dared, running the risk of getting paralysis in the left arm. This left a considerable cavity and some oozing, and he did not quite dare to leave that alone, so put a drain in and left it forty-eight hours. He failed to get the skin to unite at the drainage opening; it almost, but not quite, united. In a short time the opening began to increase and the bone to lift, and adhesive strips were put around the skull, holding the bone down. The patient went home with the adhesive strips in place, and with a fungus mass projecting from the opening. The bone flap has now been lifted up somewhat more, and between the edge of it and the edge of the skull there is a soft area; this protrudes, and it is all exceedingly soft and elastic, and pulsates. There is only a little place which is not entirely cicatrized, and from that there escapes an occasional amber drop. There has been some pain in the head for several days, a little tingling and loss of sensation in the left hand. He made an incision into that place, but failed to find any sinus, and does not know whether there has been any discharge since or not. The question that is before us is whether to leave the patient as he is or to lift the flap and remove such portions of the tumor as are compressing the brain. The character of the growth discovered is sarcoma.

Dr. G. B. Somers: The case that was exhibited reminded me of a case that came under my observation four or five years ago. In reference to the management of those herniæ of the cerebral tissue, they are very apt to follow an injury of the brain. The particular case that I have in mind was that of a young boy 12 years of age. He and another boy were playing "Indians." The other boy happened to have a loaded gun, and, in the course of the game, the patient received a bullet in the frontal part of the skull. The bullet imbedded itself in the brain. On trephining to search for the bullet, it was found to have penetrated so deeply that it could not be found. The button that was removed was cleansed in salt solution and put back and the flap of the scalp sewed back over the opening. In a few days the seat of the operation was found to be pulsating quite remarkably, and increasing in size. Later the wound opened up, the button of bone was extracted, and there followed a large hernia cerebri. The mass kept growing, and soon reached the size of a lemon. The pulsating mass was covered with reddish granulations, and easily bleeding. With every pulsation the brain tissue seemed to be working its way through the skull. I found that, in attempting to repress it by pressure, the boy complained of a great deal of pain. The result was that the mass had to be left without any compression. At this time I thought it might be a good plan to attempt the grafting of epithelium on the surface of the tumor. I asked Dr. Rixford to assist in the experiment. We took off a number of grafts from the thigh and planted them upon the mass. These grafts took exceedingly well upon the surface of the tumor, and in a very few days, on removing the dressing, it was found that the mass was completely covered with the epithelium. Shortly the mass began to contract. After a week or ten days an examination showed the mass still further contracted. I found that, whereas, in the beginning, the red pulsating mass was about the size of a lemon, it had now retracted, so that it was about the size of a walnut. This very important point in the treatment of such tumors seems to me worth recording. The boy died about a year after this treatment from an abscess located deeply in the brain. The planting of the epithelium assisted very materially in the management of this case, since it formed a protective covering and prevented the tumor from increasing in size.

Dr. Emmet Rixford: It seems to me that Dr. Sherman lays a little too much stress upon the cicatricial character of hernia cerebri. It is really a prolapsus cerebri in the beginning; brain substance actually does come out in considerable quantity, and often with great rapidity, and it takes some time for the granulation tissue to develop. In the case described by Dr. Somers, the retraction recurred so rapidly and at so early a date that it seemed to me to be influenced by the skin grafts. One experiment of such sort is, of course, not conclusive, but it certainly is very suggestive and worthy of repetition. The hernia cerebri, or prolapsus cerebri, occurs in a great majority of instances from infective cause, not merely from normal intra-cranial pressure. It would seem as though inflammation had something to do with it. In this case Dr. Sherman said there is no true hernia cerebri present. I do not know but what it would be an advantage if there were a hernia cerebri. McEwen, of Glasgow, makes use of the tendency of the brain to prolapse in the operative treatment of such tumors. He lays bare the brain, and permits the extension of the tumor, and gets rid of it afterwards. It is a far less dangerous procedure than excision of the extensive brain tumor, and more likely to result in cure. Of course, that also depends very much upon the size of the tumor, its form, and location.

Dr. Sherman: Usually hernia cerebri consists of granulation tissue, i. e., a very little brain and a good deal of granulation tissue, and it is probable that, after Dr. Somers' skin grafting, cicatricial contracture took place. That has no particular bearing upon this patient of mine, because he has a sarcoma inside the skull, which is again developing. There has been some increase of pain, great yielding of the dura, and the bone has been lifted somewhat. It is a neoplasm that is lifting and causing the protrusion. There is no real hernia cerebri.

GASTRO-DUODENAL ULCER.

Dr. Wm. Fitch Cheney reported a case of gastro-duodenal ulcer, with history, symptoms, treatment, and post-mortem findings.

Dr. Barbat exhibited a stomach taken from a case similar to that reported by Dr. Cheney. The patient first came to me about one year ago, complaining of weakness and pain after the ingestion of food, but no vomiting. She was very anemic, the blood count showing 2,500,000 reds and 65 per cent hemoglobin. There was some pain under the left shoulder-blade. She was put on pepto-mangan, and at the end of two months was apparently well, her pain having left her and her color having returned. She remained well for about one year, when she noticed that her color began to leave and the pain returned in her stomach. I was sent for one Wednesday afternoon, because the pain was getting worse, and found the girl very pale and suffering with intense pain located in the epigastric region and running through to the left inferior scapular angle. I told the relatives that there was evidently a recurrence of the ulcer which had been diagnosed the year previously, and put her on the same treatment as before. I took a blood slide, which showed some poikilocytosis, and from their arrangement I judged that there were not more than 2,000,000 reds per c. mm. On Saturday afternoon she had a hemorrhage from the stomach, and vomited about two or three ounces of bright blood. I stopped all feeding by mouth, and ordered rectal nourishment. There were no hemorrhages on Sunday, but on Monday morning she had one, and on Monday evening another. The whole amount of blood vomited was not over one pint, and the passages did not show any evidence of internal hemorrhage, but the patient was apparently bloodless, the lips being perfectly white. Monday night it looked as if the end was not far off, and I informed the parents that there might be some chance to stop the bleeding by opening the abdomen and endeavoring to locate the bleeding point in the stomach. The patient was given one quart of normal salt solution, and under local anesthesia the abdomen was opened in the median line, and the stomach drawn out. No point of thickening could be discovered, so I cut a hole in the stomach and explored it with the finger and the eye as far as possible, but nothing could be found. The incisions were sewed up and the patient put to bed, but she did not rally, and died shortly after. I succeeded in obtaining the stomach, and, on cutting it open, found a round ulcer, which presented the same characteristics as the one described by Dr. Cheney; there was a bloodvessel in the center of the ulcer, which projected up about one-sixteenth of an inch above the base of the ulcer. The ulcer was located at the center of the lesser curvature, and could not be palpated from the outside on account of the large vessels and the fat which covered the spot. I believe that in practically all cases of gastric ulcer there is a destruction of the blood-cells, especially the reds, and that in many cases this is the cause of the ulcer, and not the result of it. In the case reported, the anemia preceded the hemorrhage, and the amount of blood lost was certainly not enough to cause death.

Dr. Roy L. Wilbur: I was called at night to see a young man, a student at Stanford. Had apparently always had good health. The only contradictory fact was that at one time he had a sudden attack of intense abdominal pain. This disappeared in a day or so, and he got up and was all right. He had had some digestive trouble, especially on days when doing mental work. When I was called this night, I found him suffering from intense abdominal pain. Gave him morphin, and finally had to put him under an anesthetic to relieve the pain, but allowed him to come to after a time. At the first examination there was a great rigidity all over the abdominal wall. I suspected a perforated appendix. The pain was more in the region of the stomach, but he was not sensitive to pressure there or over the gall-bladder or appendix. I left him sleeping, and came back again about 4 o'clock in the morning, and found him asleep and apparently all right. I made an examination, and found that he complained of pain over McBurney's point. There was no one point elsewhere over the abdomen which was as sensitive to pressure. I advised removal to Lane Hospital. There was no temperature; pulse was about 78 to 82. Except for intense pain, the patient felt all right. At times had no pain, but at other times it was most severe. A certain amount of dulness appeared in the right hypochondriac region. After reaching the hospital, he was in a more or less comatose state. Catheter was passed, and brought considerable urine. No vomiting, except three or four ounces of fluid after taking medicine. There was no blood in the vomitus. He went on through the day in more or less comatose condition, with a slight rise of temperature, and with more increase in sensitiveness of right area. He was operated on that night on the diagnosis of probable appendicitis. As soon as the peritoneum was opened on the right side low down, a milky fluid ran out. The appendix was found apparently normal, except that the surface showed some hyperemia and was covered with small flakes of fibrin. During the operation he took the anesthetic very badly, and soon after the appendix had been discovered he vomited a large amount of coagulated blood and food. The abdomen was then opened in the median line and a perforated ulcer found in the anterior wall of the stomach, which had evidently been adherent to the abdominal wall. This was cut out and the wall sutured up. The escaping stomach contents had run down above the colon to the right iliac region, and had not invaded the small intestinal peritoneum to any extent. The irritation of the gastric juice, or perhaps the partial digestion of the peritoneum about the appendix, had probably caused the pain and the sensitiveness found at McBurney's point. He left the table in fairly good condition, but soon died from what seemed to be surgical shock. From the first there was a complete lack of positive history of ulcer of the stomach. He had at no time had a physician, except in the army, when he had his previous attack of pain. The suddenness of the attack, the fact that there was absolutely no vomiting of blood, the location of the sensitiveness, were misleading as to the real seat of trouble in the abdomen.

Dr. T. W. Huntington: The point in the case which interests me particularly is the absence of dilation in the presence of marked lesion in the duodenum, attended with palpable contracture at that point, as shown in the autopsy findings. We have been led to believe that dilation of the stomach follows closely and logically upon contracture of the pylorus. Nevertheless it is not uncommon to find the stomach dimensions practically normal in cases with considerable pyloric stenosis. While I am not altogether able to explain this, I regard it as of marked significance and well worth remembering. I am not disposed to acquiesce in the statement made by Dr. Barbat, to the effect that gastric ulcer is due primarily to blood changes. It is manifest that many cases of gastric ulcer recover without operation, which one would hardly expect if a serious blood change was the cause of the ulcer. As to the surgical treatment of these cases, it is to be said that early interference seems rational. Certainly in the acute stages, and in the presence of frequent profuse hemorrhages, there can be no doubt that operative treatment offers the best assurance. Furthermore, in the secondary cases, where contracture of the pylorus plays a part, and a half useless, invalid life results, operative interference is of the utmost value.

Dr. Rixford: I was greatly interested in the case, and saw the patient frequently. I felt very much the responsibility of deciding whether operation should be done or not. In fact, we had gone so far after the first hemorrhage as to definitely decide on operation, and took him to the hospital to build him up, and then to operate. We did not dare to do it so soon after so serious a hemorrhage. We thought he would gain strength by rest in bed and proper feeding, but, just as he was beginning to get into condition, another hemorrhage came along. It is a very grave question to decide whether to operate in such cases, and where. In view of the outcome, it is very easy to say we should have operated, but, had we operated, we should have taken grave chances on account of the anemia. The post mortem proved that a dissection and removal of the ulcer would have been exceedingly difficult, and almost necessarily fatal. However, I believe that, had we done a gastro-enterostomy early in the case, his chances would have been very much better, although it is by no means certain that the large vessel would have remained closely in contact with digestive fluids. My experience with gastric ulcer from a surgical standpoint has not been large, but I must admit that it speaks in favor of early operation. One case, an Italian at the City and County Hospital, had a history of long-standing gastric pain. He was not improved by prolonged medical treatment, and he had one or two moderate hemorrhages. Incision showed large area of induration in anterior wall of stomach. It was excised, and, in doing so, I removed one-fourth of the anterior surface of the stomach. In the center of the large area of induration there was an ulcer three cm. in diameter. The stomach wound was closed with silk, and the man got well. I saw him two years afterwards, and referred him to the medical clinic, where it was decided that there was no sign remaining of the ulcer, although he complained of some pain. In another case of ulcer of the duodenum, the ulcer and the surrounding area of induration were successfully removed. A third case was operated on within twenty-four hours after perforation. An ulcer of the anterior wall of the stomach nearly one cm. in diameter was completely open. There was widespread peritonitis, the result of the discharge of a large amount of stomach contents. The ulcer was excised, the wound closed, and the peritoneum flushed, but the patient died, after forty-eight hours, of general peritonitis. A fourth case had been operated on for carcinoma of the pylorus. I had removed the pylorus, closing the duodenum and the stomach wound, and then doing a gastro-enterostomy. Patient did very well for twenty-four or forty-eight hours, after which peritonitis developed. I opened the incision, and found nothing wrong, and yet the symptoms of peritonitis,—vomiting, pain, tenderness, rapid pulse,—were marked. Next day the patient died, and at the autopsy we found a gastric ulcer on the posterior wall of the stomach. It had been adherent to the transverse meso-colon, and had evidently been pulled off in the operation. I mention this case because of the difficulty in finding an ulcer of the stomach. This might have been found had search been made for it. In this particular case of Dr. Cheney's it would have been a very difficult thing to have found the ulcer, and still more difficult to have removed it. My last case of gastric ulcer was that of a physician. He had had several severe hemorrhages, though none shortly before he came under my care. He had continuous pain, which at times was excruciating, making it almost impossible for him to take food, so much so that he was obliged to take morphin. Exploratory incision showed an indurated area in the region of the pylorus, which I took to be a beginning carcinoma. I should have done pylorectomy but for the patient's extremely weak condition. Besides the duodenum was very short, and the pylorus was adherent to the pancreas, so that the operation would have been very difficult and hazardous. I did a gastro-enterostomy with Murphy button. The changes in the patient's condition were remarkable. He passed the button on the sixty-fourth day. The operation was done last April, six months ago. Recently I had a letter saying that he was never in better health, was doing a large practice, and, incidentally, running for coroner. I do not know whether the tumor was a carcinoma or merely the induration of a large pyloric ulcer. Certainly he had had gastric ulcer. Gastro-enterostomy unquestionably saved his life, and he would have died had I attempted to remove the pylorus. These cases make me feel that, in this case reported by Dr. Cheney, the chances for the patient's life would have been greater if a gastro-enterostomy had been performed very soon after the first hemorrhage. Any attempt to have extirpated the ulcer would have been fatal.

Dr. Philip King Brown: What is the proper medical treatment of gastric ulcer? It is very questionable to begin to feed patients by mouth within forty-eight hours after hemorrhage. I nearly lost a patient after such feeding, and I made up my mind not to repeat it. It is possible to keep a person in good condition by feeding by rectum for four or six weeks, and in a case of gastric ulcer it is a very desirable thing not to put food into a person's stomach after severe hemorrhage, when the hemorrhage is due to the ulcer. Another thing, will the administration of any substance that we know ever aid coagulation in these cases? I certainly believe that it will. I have seen cases where the hemorrhage could be stopped in no other way, where day after day there was considerable bleeding, and where the hemorrhage stopped very promptly by use of gelatin and by calcium chlorid, and if you can not give the gelatin in any other way, give it by hypodermic injection. Calcium chlorid may be given by rectum. It is not desirable to give it by mouth, particularly on account of the fluid necessary to dissolve it or to wash it down.

Dr. Montgomery asked Dr. Alonzo Taylor whether the method of subcutaneous feeding by sterile serum suggested by him at a former meeting of the academy would be efficient in such a case.

Dr. Taylor replied that the method had not been tested in practice beyond determining the fact that the full complement of albuminous food can be given in that way.

Dr. Cheney: In answer to Dr. Quinan's

question about the use of eggs, the procedure is not original with me; it is quite widely recommended that eggs be used in rectal enema with peptonized milk. My reason for using them is empirical. I find that the enema is better retained and the patient is better nourished with them than without them. The eggs are usually peptonized with the milk. With regard to Dr. Barbat's remark about early operation: No one is in position to recommend an operation as soon as the diagnosis is made; for you find cases that are cured by medical means, and cases that recover without any treatment at all. Fenwick, in his monograph on gastric ulcer, mentions that clinically the disease occurs in one or two per cent of all cases reported; but pathologically, from scars found at autopsy, it occurs in four or five per cent; that is, judging from scars found in the stomach, gastric ulcer occurs and heals about twice as often as it is diagnosed. I saw Dr. Wilbur's case at the hospital. There was one point not mentioned. This young fellow was scuffling, and was struck a blow in the epigastrium shortly before the symptoms began, and the supposition was that adhesions between the stomach and the abdominal wall were loosened by the blow, and perforation had taken place as a consequence. The ulcer was probably an old one, and protected by adhesions previous to the traumatism. Dr. Ophuls suggests that he found but one ulcer, yet I reported distinctly that the man got over his symptoms the first time, and made a good recovery. The man had been having these recurring attacks for years, and yet there was but one ulcer. Chronic gastric ulcer frequently heals, and then breaks down again and again. Probably the ulcer when I first saw him did heal over, and then again broke down. This man had during the last attack persistently a succussion splash, yet at autopsy no dilation was found. Some obstruction found at the pylorus, with atony of the muscular wall, may give rise to the succussion splash, without any distinct enlargement in the organ. As to the etiology of gastric ulcer, there are always two factors: First, necrosis of the mucous membrane; and, second, insufficient repair. The causative relation of anemia is explained in the second way. The original ulcer undergoes repair if the blood is in a healthy condition, but does not if the blood is depleted. As to Dr. Brown's remarks about food of patients after hemorrhages, authorities pretty generally agree that it is justifiable to begin feeding by stomach forty-eight hours after hemorrhage has ceased. When a man has lost the amount of blood that this man had lost, it is important to repair the loss as rapidly as possible; and it became a very serious question how long to permit such a man to go without giving food by stomach. I do not think that beginning the gastric feeding forty-eight hours after the bleeding had anything to do with hemorrhages recurring. It was distinctly the amount of food and the stretching of the pylorus by the curd that again induced the hemorrhage. It is very hard to decide practically when a man shows intense anemia, and when rectal feeding does not do anything for him but maintain his blood count, and does not increase it. With regard to the gelatin, if it could be applied locally it would do good in the stomach, as in case of hemorrhages following cirrhosis of the liver. But to put it under the skin is not, to my mind, of much use. It has been tried frequently in aneurism and other conditions, and has been pretty well abandoned.

DISTOMUM SINENSE—GENUS OPISTHORCHIS (BLANCHARD, 1895).

Dr. Mark J. White, by invitation, reported as follows: Generic Diagnosis.—Fasciolidae.—Body distinctly, often very greatly, elongate; anterior end attenuated; posterior end broad. Skin smooth, usually without spines. Suckers not far separated, and usually not especially large. Intestine with pharynx, short slender esophagus, and long, simple ceca. Excretory system with long sigmoid stem, usually winding between the testicles, and with short branches. Genital spore median, immediately in front of ventral acetabulum; copulatory organs absent. Testicles in posterior portion of the body, one posterior of the other, more or less distinctly lobate, or even branched. Ovary simple or lobate, anterior of testicles. Laurer's canal present; receptaculum seminis very greatly developed. Uterine coils anterior of testicles and ovary, but not extending materially over the intestinal ceca. Vitellogene glands moderately developed, lateral of intestinal ceca, not extending anteriorly beyond the ventral acetabulum.

Type Species.—Opisthorchis Felineus (Rivolta, 1884).—Habitat.—Parasitic in the liver of warm-blooded animals (mammals and birds).

The Asiatic Liver Fluke, Opisthorchis Sinensis (Cobbold, 1875).—Usually designated Distomum Sinense.

Specific Diagnosis.—Opisthorchis.—Body 10 to 20 mm. long, 2 to 5 mm. broad, flat, oblong oval, attenuate anteriorly, rounded caudally, reddish, nearly transparent in life. Tegument without spines. Oral sucker larger than acetabulum, which is about on border between first and second fourths of body; pharyngeal bulb followed by a short esophagus. Testicles branched, usually extending beyond intestinal ceca into lateral fields, and situated one caudally of the other, ventrally of sigmoid excretory canal. Ovary trilobate, immediately anterior of a large elongate seminal reservoir; vitellene glands lateral, occupying about the middle third of the body; uterus very sinuous. Eggs ovoid, 28 to 30 m. by 16 to 17 m.; contain a ciliated embryo when laid.

Hosts.—Man, cats, in Asia. Sporadic imported cases elsewhere. Eighteen cases have been found in San Francisco at post-mortem examinations.

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